RHODESIA

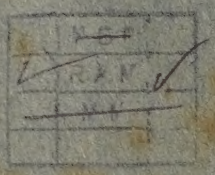
REPORT OF THE SECRETARY FOR AGRICULTURE

for the period

1st October, 1972 to 30th September, 1973

Presented to Parliament of Rhodesia
1974

Price $1,50 per copy



PRINTED BY THE GOVERNMENT PRINTER, SALISBURY
1974

Cmd. R.R. 2–1974]

G.P. & S. 66077-5–730.

REPORT OF THE

SECRETARY FOR AGRICULTURE

Report of the Secretary for Agriculture

for the period 1st October, 1972 to 30th September, 1973

World Agricultural Survey

ONE of the relieving features to an agricultural industry emerging from the aftermath of a long dry summer is the prospect of a buoyant commodity market. On this score 1972–73 has been quite exceptional for there has been a phenomenal rise in world commodity prices. Indeed the upward spiral has taken the prices of many commodities to all time record levels. The immediate causes of this commodity price upsurge were harvest failures; a strong recovery of demand in many major consuming countries; international monetary disorder; and the pressures of world-wide inflation. Furthermore, the price explosion has been magnified by speculation which has spread from the stock markets and foreign exchange markets to the commodity markets, all fed by suspect currencies moving around on the world bourses.

Heavy demands were made on world grain supplies as a result of harvest failures in many parts of the world, notably the Soviet Union and China. Production in the main grain producing countries fell by over 3 per cent. on the previous year. The net result has been that the prices of many grains have been twice the level of a year ago. Although the 1972–73 cotton crop was a record it was insufficient to make good the depletion of stocks and satisfy the increased demand. The emergence of China as a major new buyer has been accompanied by several setbacks in world production during the current season, notably in the United States and Pakistan. In the United States hopes for a major expansion in cotton were dashed when floods hit the Mississippi basin thereby delaying planting and causing considerable areas to be diverted to crops in even shorter supply like soya-beans and maize. From the beginning of the year lint prices soared upwards and by September were more than double the price of a year ago.

The general shortage of protein supplies has been aggravated by the failure of the Peruvian fish catch and this has forced consumers to seek alternatives. Oilseed prices have moved up sharply in sympathy. At the end of June the United States imposed a temporary embargo on soya-bean exports which caused dismay and confusion in the European stockfeeds trade. An 11 per cent. increase in world oilseed production in 1973–74 foreshadows lower oilseed prices with a concomitant effect on oilcakes and the related fats and oils.

Bad weather has also played its part in pushing prices of cocoa, coffee and sugar to record levels. Heavy buying of sugar by Russia in 1972, because of its own poor crop, together with a fall-off in supplies from Cuba, reduced world stocks to a very low level and caused prices on the free market to soar. Frosts in Brazil during July 1972 led to supply shortages in coffee which have become apparent this year with the result that exportable production is well below estimated demand. The strong bargaining position of the coffee producers has encouraged them to adopt a strong line over compensation for dollar devaluations and this has led to a breakdown of the International Coffee Agreement.

World red meat production in 1972 increased by 1 per cent. Beef and veal production reached new records in most countries of the world, a major exception being Western Europe where the rebuilding of dairy herds caused an 8 per cent. decline. The world's two major beef exporting countries—Argentina and Australia—recorded production increases of 9 per cent. and 12 per cent. respectively. Prices for beef in the United States and Western Europe reached record levels provoking sharp reaction from consumers in the United States. Production is expected to increase in Western and Eastern Europe, Australia and Latin America. With more beef being produced together with consumer resistance it is possible that beef prices might ease, though forecasts of cheaper beef have been notoriously wrong in the past.

The strong expansion of the economies of the United States, Japan and Western Europe has provided an impetus for the upsurge in commodity prices including basic feed stuffs and industrial raw materials. The surplus stocks overhanging many commodity markets during 1971 and much of 1972 were absorbed far more quickly than expected and this, coupled with production restrictions in some instances, has resulted in the emergence of shortages in some commodities. The prices of many commodities would not have risen to such high levels if it were not for the international currency situation for, during the frequent bouts of currency confusion which hit so many countries during the year, there was a definite movement out of paper money and into commodities to protect against the effects of devaluation. This distrust of international currencies was highlighted by the scramble for gold and towards the middle of the year the free market price for gold exceeded U.S. $100 per oz., a salutary reminder of the metal's monetary pre-eminence.

It is always hazardous to predict the pattern of world commodity prices. At the height of the Korean war boom there was a widespread belief that prices would remain high and commodities scarce. The basis of this argument relates to trends in demand and supply with world population and income growing too fast for food supplies to keep up. However, these long-term trends neither explain the doubling of prices in little over a year nor rule out the possibility of a fall in the coming year. Short-term commodity price swings can be and have been large enough to overshadow long-term trends. Bad harvests the world over are seldom repeated and world output and trade are unlikely to continue growing at the frenetic pace of 1973.

The Rhodesian Season 1972–73

If there is one weather feature which stands out in the minds of the farming industry during the past season it must surely be that perverse creature which bore the technical name of the Botswana Upper High. To an industry which has been inculcated into a belief that its season fortunes are dictated by the activity of the Inter-tropical Convergence Zone it was disconcerting to learn the effect that other weather features can have on the industry. The onset of the rains held off in many areas until January and those areas which were fortunate enough to enjoy early November rains were faced with the problem of replanting by late December. By the time the rains arrived in mid January the only crops which stood any chance of reaching maturity were the short season types. Remarkably enough, there were isolated areas towards the north which secured adequate rainfall at the correct time to ensure a very satisfactory harvest. The general concensus was that the drought was the worst in the country's history over the past 25 years at least. The total volume of agricultural production in 1972–73 will probably be down by one-third that of the previous season, largely as a result of the sharp fall in grain production. The effect on total income may not be all that severe since there was an improvement in both the volume and value of tobacco production. Furthermore, enhanced commodity prices for grain, oilseed, cotton and livestock products should compensate for some of the fall-off in the volume of production.

In early January steps were under way towards mounting a drought relief exercise and the outline of such a scheme was announced by the Minister in early March. The mechanics of the drought relief scheme were worked out between officials from the Ministry and the R.N.F.U. and R.T.A. together with relevant commodity association representatives. The valuable and constructive role played by the producer associations in formulating the scheme was matched by the responsible manner in which they approached the scheme's prime goal, namely, to place the farming industry in as satisfactory a position as possible to enable it to continue operations in 1973–74. Equally important in the successful administration of the scheme was the fundamental roles played by the representatives of the various Provincial and District Drought Relief Committees. As so often in exercises of this nature, the successful implementation of any plan depends upon the work, knowledge and dedication of the man on the spot.

Outlook

The immediate outlook for agricultural commodities in world trade is a function of current production; for with little or almost no buffer stocks being held against a possible shortage in 1973 the world is dangerously dependent upon current production and therefore weather conditions. World agricultural production in 1972 actually declined by 1 per cent., a most unhappy state of affairs when one considers the present 2 per cent. growth rate in the world's population. The value of world agricultural trade in 1972 increased by 14 per cent. which compares with the 5 per cent. increase in the previous year. However, this expansion was largely due to a rise in prices and the real value of world trade rose by 7 per cent. With the present tight commodity supply position and the associated high prices, the bogey of protective policies adopted by certain trading blocs has receded into the background although it will still dictate the pattern of future trade. Specifically it will be the reforms which may or may not be adopted by the E.E.C. which will have considerable influence on world trade. At present the high end prices used to support farmers' incomes within the E.E.C. is distorting the normal supply-demand relationship, not only within the community but also outside the trading area. This distortion prevents the community from establishing normal trading relationships with the rest of the world. With this in mind there are grounds for being sceptical about the prospects for success in the current Nixon Round Trade Talks, the object of which is to bring about even more extensive liberalisation of world trade than the Kennedy Round of the 1960s.

With this cursory assessment of world trade prospects it is pertinent to ask what happens in 1974 for Rhodesian agricultural products. The delicate balance between supply and import demand for grains appears to be tipped slightly in favour of supply as production conditions in the northern hemisphere appear to have been good. The outlook therefore hinges to no small extent upon the southern hemisphere crops. The cotton industry surely enters the season with prospects never so bright, for with rumblings that the United States might be compelled to introduce curbs on the export of lint, the scramble for lints of other origins has added to the price push. Even the threats from synthetics has receded somewhat and the industry appears poised for a considerable fillip. The increased tobacco target for 1973–74 at a guaranteed 60 cents per kilogram will undoubtedly herald a degree of optimism in an industry which has experienced an arduous time since 1965. The local oilseed industry although relatively small can undoubtedly benefit from the current tight protein and oil positions. However, with the large soyabean crops expected in the United States and Brazil, together with an improved Russian sunflower seed harvest, the international market situation will probably ease in 1974. The prospects for beef will no doubt depend upon the housewives' willingness to switch to substitutes. Certainly the demand exists but many governments are making serious efforts to increase their domestic supplies of beef as part of their efforts to hold down prices. These moves have generated some uncertainty in the international beef trade. Certainly any increase in beef supplies will have to be sought from traditional methods since efforts to introduce new technological methods of production have fallen foul of environmentalists who have been highly critical of these methods both from the point of view of the ultimate consumer and from the point of view of the conditions in which the animals would be kept.

The over-all situation for agricultural commodities is as good as it ever has been and it is to be hoped that the farming industry will capitalize upon

this position. Nevertheless a flourishing agricultural industry, which is after all the principle base to our economy, does not come about through the chance occurrence of a combination of foreign harvest misfortunes and unprecedented demand for raw materials. It must be based upon a system which enables it to survive indefinitely the irrational behaviour of weather and prices and the more subtle behaviour of international politics. These factors influence other businesses as well but for obvious reasons affect farmers much more deeply. The struggle to relate costs of production to what the market will realize is an enduring feature of the agricultural industry and producers would be advised to take cognisance of this and make the necessary provisions.

It is always easy to offer advice to others on the manner in which they should or should not employ their resources. In the final analysis, however, it is the individual farmer who must make the decision. The ultimate calculations must be made by the individual who must assess his margins rather than the commodity end price itself. At a time when these end prices for certain commodities appear to make the margins particularly attractive, one must advocate a certain amount of caution in making major alterations to a whole farming system. The lessons learnt from the tobacco diversification exercise must not be forgotten. Although flexibility in production systems is an attractive goal it must nevertheless stem from a sound long term plan in which management and good husbandry combine to ensure success. In such a system there is small room for chasing rainbows in the guise of particularly favourable specific commodity prices. Government can give general guide-lines but the decision rests with the individual who must assess the opportunities in the light of his managerial ability, capital resources and his ecological environment. The basic tenet in the free enterprise philosophy is to "look after oneself" for from this ultimately stems over-all national welfare which is the aggregate of individual well-being.

It is pertinent to draw the attention of other sectors of the economy to the closely knit association between their fortunes and the fortunes of the agricultural industry. Both the commercial sector and the agricultural sector rely heavily on the goods and raw materials provided by each other. An estimated $200 million worth of transactions take place annually between these two sectors of the economy so that any misfortune which strikes the one can have serious consequences for the other. Despite this reciprocity of dependence upon each other, agriculture is essentially a primary industry and as such will continue to remain one of the spearheads of the country's successful development.

Resource Use

Considerable potential still exists for the further exploitation of the country's land resources. One of the obstacles to achieving this goal is the problem of combining this resource with suitable capital and human resources. Unfortunately these two seldom go hand-in-hand. The substantial sums required to secure suitable land and the high cost of capitalizing a farm make it extremely difficult for a young farmer to secure the farm of his own unless he is fortunate enough to have a rich father or marry into a fortune. The problem is further aggravated by the fact that profit from farming operations appears to be a relatively minor consideration for many of those who are presently in a position to invest in land. A general concensus exists over the need to attract and retain young people on the land yet the prospect of a career as a farm manager to some land baron has a limited attraction to young farmers. Consideration has been given to tenant farming, for this does seem to overcome the land investment problem and certainly the return on the tenant's capital would be more attractive. However, no matter what certain pundits may say about the need to separate the ownership of a farm from farming operations, there is a certain antipathy towards tenant farming. It seems to be every farmer's goal to be able to farm without a landlord or his agent looking over his shoulder or arguing about the rent. The problem is complex but the Ministry is working towards methods of overcoming these issues and it is hoped that concrete proposals will be forthcoming in the future.

It is not perhaps entirely coincidental in a year during which the country has experienced a most serious drought, that the subject of water has been a foremost topic. Indeed the consequences of water shortage this year has been brought home to many an urban user as well as to the agricultural industry. To say that water is vital is to state the obvious and the Ministry welcomes the strenuous efforts being made by the Ministry of Water Development on its forward planning and offers its full co-operation. The efficient use of water by farmers is also extremely important and a good deal of work is being undertaken to this end.

During the year there has been considerable public debate on the level of African wages throughout the economy. In particular the agricultural sector has come in for sharp criticism over the existence of the large wage differential that exists between itself and other industrial sectors. Controversy has centred on the question of whether the creation of employment opportunities should have a priority over increased wage levels. Whilst not wishing to enter into this debate it must be self-evident to the agricultural industry that in order to attract and retain labour in relation to the state of the labour market in other sectors of the economy, the pressure on conditions of service, including wage levels, will intensify. Since African wages already constitute roughly one-third of the variable costs of production, any increase in wage levels can only create an even greater incentive for the careful assessment of labour requirements and its productive employment.

Having touched on certain topical resource issues and the need to establish sound policies in their efficient utilization, it is necessary to stress that policies are one thing and their successful implementation is another thing. The co-ordination of the two depend to no small extent upon the existence of a sound and efficient public administration. A crucial part in the formation of such a system is

ensuring that the public administration, no less than its counterpart in the private sector, is served by individuals of high calibre. It has been said that in a comparatively small country such as Rhodesia it is not easy for the public sector to compete favourably with the private sector yet it is essential that it does not lose ground and become no more than a residual employer. Accordingly it is to the national interest that the public sector be placed in a position to attract and retain staff. Improvements in conditions of service in its wider sense are very necessary and this is receiving the urgent attention of the Public Services Board.

Land Subdivision

During the year 51 applications for subdivision were recommended for approval and 13 for rejection; 53 others were withdrawn by or referred back to applicants. Eight applications were still to be reported on by various departments.

Acknowledgements

I wish to record my sincere appreciation for the fine services rendered to the agricultural industry by so many organizations and individuals during a particularly difficult year. I must single out for praise those producer-organizations, who remained a stimulus throughout, to the chairmen, members and management of the statutory boards and to the chairmen and members of the various drought relief committees. Finally I must pay tribute to the loyal and devoted service rendered by the Ministry's staff and in particular to those officials who serve in the field. For some of these people the circumstances have been unusual to say the very least but they have responded to such challenges magnificently.

The Economics and Markets Branch Report

for the period 1st October, 1972 to 30th September, 1973

THERE is evidence to suggest that in terms of farm incomes the agricultural industry has made a significant recovery over the past two years, and that despite the drought in 1972–73 the level of farm incomes should at least be maintained. This has, however, no more than halted the growing disparity between prices for agricultural products and those that farmers have had to pay for their inputs. Let there be no doubt that the Rhodesian farming industry went through a rough time of low prices throughout a larger part of the 60s. Thus the rise in world prices of practically all commodities means that in the short term at least farmers should be able to recover some of the ground they lost in real income terms through the last decade. Prospects for the agricultural sector look promising for the immediate future but there are some important factors to be considered which have already been elaborated in the Secretary's report.

In 1972 the F.A.O. was predicting that by 1980 the world would be in chronic over-supply of almost every agricultural commodity but beef. This contrasts sharply with their recent statements that world production resources are unlikely to be able to feed the present population explosion. The protagonists of this Neo-Malthusian doctrine advocate the promotion of increased agricultural production, but what they failed to remember is that hunger alone, unaccompanied by cash is no use as a market for food. This applies particularly to the Rhodesian situation, where distance from the rich-consuming countries is considerable and is in no way recompensed by the fact that the country's natural markets in Africa and Asia are not generally wealthy enough to buy at prices which would keep Rhodesian farmers solvent.

It is surely lack of markets and not lack of resources which presently raises the spectre of world food shortage. There is more land unused than used in the world, and there is more farm land underfarmed than well-farmed. The resources of modern technology in crop and animal husbandry are only being applied by a few of the industrialized countries. The world then is overflowing with unused food production resources. They are unused because, to a large extent, farmers lack the incentives to develop them and are only satisfying current population demand. Food production could be expanded to meet any foreseeable rise in world population provided there is an adequate incentive.

Farm Management Research

The Annual Report on Farm Management Data covering records for the year 1971–72 shows an improvement in the profit position of the farming industry over the previous year. Indeed the records show farm profit levels to be the highest since U.D.I. However, comparable data from the five-year identical sample suggests that the improvement was primarily in the upper profit bracket of the industry. In other words that segment of the industry which enjoyed above average profit levels five years ago seems to have improved its position more than that which was in the below average profit level. It would appear to be a repeat of the old story of the rich getting richer. One of the inescapable features which is shown up by detailed studies of the results is that high levels of profit are associated with high levels of income which in turn stem from larger scale farming operations or from the production of particularly high value commodities such as certain specialized animal products, sugar and in certain cases fruit and vegetables. No matter how unpleasant the bogey of "Get big or get out" sounds, one must face the fact that the extremely narrow margins for agricultural products necessitate larger scales of output. It is a rationalization measure which is being forced upon the industry, though this must not be interpreted as the end for the family farm.

The farm management survey covers the results of 115 farming enterprises; admittedly a very small sample on which to base general conclusions. Most environmental conditions and a very broad spectrum of financial circumstances are covered by the survey. The average level of net farm profit embraces a wide range from profits up to $50 000 to losses of $10 000. Overheads weigh heavily on the lower profit segment of the industry. In absolute terms there is small difference but whereas overheads represent 30 per cent. of variable costs in the upper profit group they constitute 50 per cent. of variable costs in the lower profit group. This lends credence to the popular contention of spreading overhead expenses on a larger scale of operations. It is noticeable that redemption payments constitute a heavy commitment in the overheads of the low bracket group, being more than double of that for the upper group. Furthermore, interest and bank charges are on average 50 per cent. higher for the farms in the lower profit bracket suggesting that the more successful farmers are in a better position to finance their operations from their own resources.

It is impossible to single out any individual combination of enterprises as being the key to success. In fact several highly successful enterprises are one-commodity enterprises such as tobacco, maize, cotton and beef but there again such one-commodity enterprises also appear at the bottom of the scale. Certainly there are a much greater proportion of tobacco enterprises in the upper profit segment than in the lower profit segment which implies that tobacco is still one of the better cropping enterprises. What all the various surveys indicate is the fact that a considerable number of farming enterprises are in a satisfactory, if not a very sound financial position. There are also the very large number of enterprises in a very unsound financial position. The problem lies with this latter group since because of their poor financial situation they are unlikely to improve upon their income position by themselves and in such circumstances are destined to remain in a depressed state.

Development Economics

In November, 1972, the Branch was committed to undertake at short notice a survey into the financial circumstances of the farming industry in the northern fringe areas of Mashonaland. The Branch's resources were supplemented by staff from the Department of Conservation and Extension who kindly assisted in much of the field work. The survey covered 40 farmers selected from 12 areas along the frontier fringe. Although these farmers were selected on the basis of average ability, they were slightly below average in terms of scale of production. The report presented in the New Year examined trends in farm profitability over a six-year period, 1965–66, to 1970–71—and related profit levels to the capital investment.

A noticeable feature of the survey was the decline over this period in the contribution by tobacco to farm output. Maize and livestock were the main enterprises filling the gap. The increase in maize plantings was accompanied by significant increases in expenditure which were not always matched by comparable increases in income. The severe yield fluctuations for maize over this period highlight the fact that maize is far more susceptible to drought than tobacco. The impact of drought conditions are therefore more onerous on a maize economy than on a tobacco based economy.

During the remainder of the year work proceeded on the Input/Output survey covering some 150 farmers for the years 1969–70 and 1970–71. The main purpose of this survey is to identify trends in agricultural profitability and is a follow-up on two earlier surveys. One of the problems of this type of survey is that it depends entirely upon the accounts prepared for income tax purposes. There is inevitably a considerable delay in the preparation of these accounts so that the data is very much historic when it is eventually compiled into a survey. Furthermore, these accounts are seldom prepared for management purposes and their suitability as a determinant of farming fortunes is often questionable.

During the year a detailed report was prepared on the results of records maintained by 20 irrigators on the Chilonga Irrigation Scheme in Matibi II Tribal Trust Land. This survey covering the year 1971–72 was a follow-up to a pilot survey undertaken in 1970–71. This exercise has been conducted at the behest of the Ministry of Internal Affairs and further work of this nature is in hand. In the Wiltshire African Purchase Area an elaborate exercise is being undertaken on the economics of cattle ranching. The results of the first year's records should be available shortly.

Supply and Trade

A small section of the Branch is involved in continuing exercises related to the problems affecting the supply of agricultural inputs. Whilst these problems and the solutions thereto are not the subject of, or indeed offer a scope for, the preparation of informative reports, it is nevertheless work of extreme importance to the agricultural sector. The considerable increase in the volume of agricultural output poses major problems regarding the evacuation of products. The fact that agricultural production is largely seasonal in nature creates sharp seasonal peaks in the demand for transportation facilities. Traffic movement plans have to be co-ordinated with the traffic flow requirements from other sectors of the economy and the Branch maintains a close liaison with the representatives of many sectors of the economy in ensuring that whilst the requirements of the agricultural industry are satisfactorily attained its disruption upon the rest of the economy is not severe.

Acknowledgements

The Branch wishes to acknowledge the co-operation and assistance received from many Government ministries and departments, statutory bodies and from individuals and organizations in the private, commercial and industrial sectors. In particular it is necessary to acknowledge the assistance provided by those farm management specialists in the Department of Conservation and Extension who assisted in the frontier fringe survey. Without the ready and willing co-operation of so many farmers the surveys undertaken by this Branch would not be possible. To these individuals I must convey my appreciation. Finally, I must pay tribute to the officers and staff of this Branch for the manner in which they responded to the extra load imposed on them by some periodic severe staffing problems.

Publications

1. Profitability Survey: Northern Fringe Areas of Mashonaland 1966–1971 (December, 1972).
2. An Economic Appraisal of a Tribal Irrigation Scheme in Matibi II Tribal Trust Land 1971–72 (March, 1973).
3. The Seventh Annual Report of Farm Management Data (August, 1973).
4. Agricultural Economics and Markets Report (July–December, 1972).
5. Agricultural Economics and Markets Report (January–June, 1973).

W. V. LACEY
Chief Agricultural Economist

Land Settlement Branch Report

for the period 1st October, 1972 to 30th September, 1973

TRANSFER of African Purchase Land settlement administration from the Ministry of Agriculture remained pending throughout the year.

Since February, 1973, the staff dealing exclusively with African Purchase Land matters was accommodated in the Old Police Station, Baker Avenue, while the staff concerned solely with European settlement and consisting of only two posts since July, 1973, was accommodated with the Ministry of Agriculture. These moves released office accommodation in Electra House for the pressing needs of other ministries.

African members of the public made 454 personal enquiries at the Branch's office. European enquirers were not recorded throughout the year.

Land Administration

Progress in the investigation and allocation of State Land reserved for land settlement purposes is given in the Appendix.

Lease Administration

The following summarizes lease administration during the year:

	European	*African*	*Total*
New leases finalized	17	59	76
Leases amended to enlarge the holding	1	52	53
Renewals with option to purchase	13	385	398
Renewals without option to purchase	—	50	50
Cessions	4	23	27
Successions	—	24	24
Cancellations	2	9	11
Relinquishments	—	45	45
Sub-leases to private companies	5	—	5
Titles authorized by the Branch	80	206	286

Wengi Proving Unit

This unit was established in 1966 to test the viability of a small but intensively managed irrigation farm in the Mazoe Valley. Viability in excess of standard criteria has been established, and its manager took over the unit for his own account with effect from 30th September, 1973, against the book value of the assets, as provided for in his agreement.

Acknowledgements

The assistance and co-operation received from several departments, especially the Department of Conservation and Extension, the Department of the Surveyor General, the Lands Inspectorate and the Government Attorney, as well as ministries, in particular the Ministry of Lands and Natural Resources and the Ministry of Internal Affairs, are gratefully acknowledged.

I am also indebted to my staff for their loyal and devoted services.

G. B. THORPE,
Under-Secretary,
Agricultural Land Settlement.

State Land administered by the Branch of Agricultural Land Settlement during the year ended 30th September, 1973	European		African	
	Number of units†	Hectares (approx.)	Number of units†	Hectares (approx.)
A. LAND HELD UNDER LEASE				
Land held under lease as at 30.9.72	415	811 809	4 035*	525 991
Land leased during the year				
(i) New leases	18	23 114	220	25 240
(ii) By amendment of existing leases	—	1 640	—	3 541
Sub-total	433	836 563	4 255	554 772
Less: (i) Cancellations and relinquishments during the year	2	346	54	8 007
(ii) Titles issued during the year	80	176 087	292	28 226
(iii) Net decrease to area by revised survey	—	—	—	3 407
Total land held under lease at the end of the year	351	660 130	3 909	515 132
B. LAND HELD UNDER OFFER				
Land held under offer as at 30.9.72	16	21 575	78	16 914
Land allocated during the year	62	61 418	339	25 108
Net increase to area by revised survey while under offer	—	70	—	—
Sub-total	78	83 063	417	42 022
Less: (i) Land leased during the year				
(*a*) New leases	17	23 114	220	25 240
(*b*) Amendment of existing leases	1	1 640	52	3 541
(ii) Offers withdrawn	—	—	13	42
(iii) Net decrease to area by revised survey while under offer	—	—	—	216
Total land held under offer at the end of the year	60	58 309	132	12 983
C. VACANT LAND FOR SETTLEMENT				
Vacant land as at 30.9.72		205 433		129 564
Land released by the Ministry of Lands for settlement during the year		193		6 161
Cancellations and relinquishments of leases		346		8 007
Withdrawal of offers		—		42
Net increase to area by revised survey		8 500		98
Sub-total		214 472		143 872
Less: (i) Land allocated during the year		61 418		25 108
(ii) Land withdrawn from settlement		16 345		2 667
Total vacant land as at the end of the year		136 709		116 097
GRAND TOTAL FOR LANDS ADMINISTERED BY THE BRANCH AS AT THE 30.9.73	411	855 148	4 041	644 212

† Units include all pieces of land leased separately both farms and extensions.
* Including Agreements of Purchase.

Annual Report of the Central Library–Ministry of Agriculture

for the year ending 30th September, 1973

THIS period saw the Library settled for the first time in its existence in spacious and airy premises. Although the move entailed a lot of rearrangement and it took a little while to complete the organization of the stock, the move has been reflected in an increase in the output of work and efficient use of the library, as well as the comfort and wellbeing of the staff. Quite a number of useful items were discovered in the upheaval.

A very successful meeting of the Rhodesian Library Association was held in Central Library soon after the move and the new quarters were much admired. Great interest was shown by the visitors in the activities of the library, to many of whom it was a complete surprise, both in size and the scope of its operations.

The card catalogue has been revised and is now in three parts, Title, Subject and Classified. It had reached such proportions that the old dictionary arrangement was too cumbersome for convenience.

The pamphlet collection has been reorganized and clearly indexed. Four hundred and forty-five catalogued pamphlets and 806 photocopies were added to them during the year.

The inter-library loans section was particularly busy in 1973 dealing with 516 loans divided between local, South Africa, Malawian and even a few American libraries. There has been an increased demand for reprints or photocopies of papers by the Ministry's professional officers from a number of overseas countries, including even some behind the Iron Curtain and China.

It is particularly pleasing that of the 2 675 requests received by the library in the past year, it has only been necessary to cancel 65. This is especially noteworthy when one remembers the obscurity of a great number of these requests, and that a proportion of the cancellations have been occasioned by the resignation of the requester.

Two New Book Lists were issued in 1973 and circulated among the Branches and Stations. A total of 139 books was added to stock during the year.

The library circulates 525 journals, which are published at weekly, monthly, quarterly, semi-annual, and annual periods. When it is realised that this entails approximately 5 600 circulations, to an average of 10 persons per title (i.e. *circa* 56 000 circulations) it will be appreciated that this is a very substantial part of the library's day to day work. Sixty-six of these have roneoed copies of "contents" circulated rather than the journal as the number of persons wishing to see them is too great to allow a rational circulation in any other way.

An innovation in the circulation of publications has been initiated this year, that of circulating Annual Reports were of particular interest. This has received a warm response particularly from the outlying stations. A review of the circulation needs of the various officers of the Ministry is in progress at the moment and it is hoped that this will result in a more realistic circulation of publications.

Four hundred and eighty journal subscriptions are ordered and their delivery supervised by the library for various sections of the Ministry.

Work started during the year on the reorganization and cataloguing of Government publications and Reports of Commissions. This revealed that there was a certain amount of duplication and the clearance thus affected has led to easier access to the papers. A new scheme initiated by the Government Librarian, whereby duplicate material may be disposed of via the National Archives and old but still valuable material will be stored by them on a retrieval basis. This will do much in the coming year to relieve the congestion on the Library's shelves and leave space for the constantly increasing volume of current literature, without the risk of losing valuable reference material.

The Librarian visited the libraries of Entomology, Plant Protection, Gwebi and Grasslands, at their request, to discuss and advise on their problems.

J. MAINWARING (Mrs.),
Librarian.

Annual Report of the Director of Research and Specialist Services

for the year ending 30th September, 1973

THIS was a difficult year which started with a severe drought. Although crop yields suffered from the drought, experimental work was less seriously affected, thanks to the efforts of the field staff. The cost to the department of maintaining trials was materially increased but fortunately some late rains reduced the anticipated costs of feeding livestock. It is hoped that the impending salary review of the Service will do much to stop recent staff losses.

A major change within the department was the reorganization of the field branches into two Divisions, a Division of Crop Research and a Division of Livestock and Pasture Research. There are no changes within the Specialist Branches Division or in the Branch of Agricultural Education.

Dr. R. C. Elliott took up his appointment as Assistant Director responsible for Livestock and Pasture, Mr. P. A. Donovan retaining responsibility for Crops and Dr. D. H. Saunder for the Specialist Branches.

The year saw the policy decision to transfer the centre for horticultural work to Grasslands Research Station and planning for the implementation of this in the coming year has started.

In the field of Biometrics the decision was taken to concentrate on the development of a new, more powerful, statistical analysis system to be known as GESTALT, which would also be sufficiently simple in use for individual research workers to programme and present their own data for computer analysis, thus freeing the biometricians to participate more fully in specific departmental projects. Progress is being made in the development of this system.

The Directorate continues to sit on a wide range of boards and standing committees and members of the department took an active part in organizing a number of congresses, including that of the Soil Science Society of South Africa, the first to be held outside the Republic, the South African Society for Plant Pathology and Microbiology and the Grassland Society of Southern Africa, all held in Salisbury. Rhodesia is proud to have played host to these meetings. Two members of the Directorate are on the Organizing Committee of the Rhodesian Science Congress appointed to set the stage for the Congress to be held in Salisbury in 1974.

After the locust outbreaks of the last two years it is gratifying that no outbreak has yet occurred this year. This must be attributed to the success of the spraying of fledglings conducted in the Buzi Flats in Mozambique in March. However, there is no room for complacency and following a breakdown of the International Red Locust Control Organization in Zambia and the reported escape of large swarms from the Wembere, further locust activity must be anticipated which lends weight to the need to establish a small, but permanent, locust control unit in Southern Africa, a move which was supported in principle at the SARCCUS Standing Committee on Plant Protection which met recently in Angola.

Unfortunately, after freedom from the disease for many years, coffee rust has reappeared in the Eastern Districts, but it is hoped that the control measures which have been devised, if adhered to by growers, will reduce the seriousness of its impact.

In the regulatory field, amendments have been made to legislation for the destruction of cotton and neglected crops; to the nursery regulations and to the Seed Certification Scheme. Major effort has been expended on drafting a Plant Breeders Rights Bill shortly to be presented to Parliament.

Considerable development has taken place at the Agricultural Research Centre in Salisbury including the completion and occupation of the new Plant Pathology laboratories and alterations to the old laboratories to establish a training, publications and information unit as well as provision of accommodation for the Pesticides Registration Officer and offices for the Agricultural Research Council and the completion of a number of new greenhouses.

The department was proud to see the award to Dr. R. C. Elliott of the "Farming Oscar" for outstanding work in animal nutrition and the following officers are complimented on the award of higher degrees: R. P. Denny (M.Sc.); W. F. v. d. B. Morkel (M.Sc.); W. M. O'Donovan (Ph.D.); P. L. Greenfield (Ph.D.); R. G. H. Godwin is also to be congratulated on his B.Sc. award.

We record, with sorrow, the untimely and tragic death of Mr. J. C. Parkin at Chipinga.

The department had the pleasure of welcoming a number of important visitors during the year.

The list of publications by staff members appears in the full annual report of the relevant Branch or Station.

I should like to take this opportunity to thank all the staff of the department for their loyal support and untiring effort during a difficult year and on behalf of the staff I should like to thank our colleagues in other departments and ministries for their co-operation which has been vital to many of our activities. To the R.N.F.U. and to the A.R.C. I am grateful for the good relations which have been established and for the support which has been forthcoming from commodity associations for many research programmes.

DIVISION OF CROP RESEARCH

Following the internal reshuffle of departmental responsibilities already referred to, the Division of

Crop Research replaces the Branch of Crop Production. Summer programmes of crop research were affected by the severe and country-wide drought but to a lesser extent than crop production. The small number of failures among field trials and the relatively small yield depression in them reflects the high standard of management and attention to detail applied by dedicated research staff to their work.

Winter research programmes were, however, under strain as a result of depleted irrigation water supplies and unless next season starts very favourably, 1973–74 summer programmes may be affected.

AGRONOMY

Rust incidence in wheat in the Lowveld was greater than previously experienced, which proved advantageous as far as the wheat breeding and variety testing programme was concerned. It was possible to undertake a critical evaluation of leaf rust and stem rust resistance, and many hitherto promising varieties were discarded because of high disease susceptibility ratings. Two new varieties, B73 and C73, were released for lowveld production following successful trial results over several seasons.

Nitrogen trials were continued on the different soil types, mainly to study responses following summer legume crops; conclusive results were obtained which enabled a long series of nitrogen trials to be terminated.

More detailed investigations were undertaken to study the effects of time and rate of application of CCC, and to determine whether tall varieties would respond to higher nitrogen levels if lodging was controlled with the application of CCC.

Also in the Lowveld valuable results were obtained from a study to determine the effect of differing plot size on the error variance in a trial, and the magnitude of the interface effect between plots of different varieties.

The programme of agronomic trials on maize was maintained at a reduced level, and comprised only trace element trials on paragneiss and on alluvium. No significant treatment effects were recorded at either site, indicating that the soil productivity problems at Sabi and multiple cobbing at Chiredzi were not attributable to trace element deficiencies.

At Grasslands the quick maturing maize variety R200 gave yields up to 6,96 t/ha in a tillage trial in growing maize on dryland. Because of the low rainfall, the late maturing variety SR52 gave lower yields in several other experiments.

At Makoholi, the maize variety trial averaged 7 700 kg/ha, while the sorghum variety trial was a write-off. The Sandveld irrigation trial yielded up to 19 500 kg/ha.

The lowveld programme of research on rice was considerably reduced after a decision had been made to drop routine agronomic investigations and concentrate on blast disease problems. Efforts to screen varieties for blast resistance were intensified, and during a season of high blast incidence valuable results were obtained. Attempts to produce a blast inoculum for disease control trials using chemical fungicides proved unsuccessful.

It was shown that rice productivity declines markedly when grown in successive seasons on the same land, and the need for strict rotations was clearly demonstrated. Extremely high yields were obtained under paddy conditions on alluvial soils.

A barley variety trial was conducted during the winter season; results confirmed those obtained previously in showing that variety B72 was far superior to all other varieties tested.

In grain sorghum work at Gatooma Research Station, studies were carried out on the effect of spacing and tillering on different cultivars in an attempt tp assess the possible performance of a non-tillering cultivar. In addition, a number of related lines were grown in a trial designed to provide informaton on selection criteria suitable for non-tillering lines. Six new pedigree selection series were started and commercial cultivar trials were conducted at five sites.

Severe drought conditions at Gatooma interfered with the cotton agronomy programme and caused at least two trials to fail. Trial work at Panmure showed that early November was the optimal planting time for Del Cerro and the optimal nitrogen level was about 80 kg/ha. Splitting the total nitrogen application showed only marginal increases.

The performance of Albar, Albar Okra and Deltapine Okra was compared at Gatooma with emphasis on high population tolerance. Delatpine Okra showed the best yield potential.

In trials duplicated at Panmure and Gatooma under irrigated and dryland conditions Albar outyielded Del Cerro by about 5 per cent. Albar responded best to the recommended spacing of 0,9 m between the rows for dryland conditions but under irrigation it performed equally at 1,35 m between rows. Del Cerro responded well to this spacing but 1,80 m did not increase yields under any conditions.

The dry matter apportionment trial in the physiology programme showed that a certain degree of defoliation could be sustained without affecting boll growth. Bolls proved to be the preferred sink for assimilates and the stem was shown to be a strong secondary sink, especially in the absence of bolls.

The bulk of the cotton acreage on Lowveld Research Stations was devoted to pest research trials and variety trials, both being conducted on behalf of Gatooma Research Station. The balance of the research programme was of a physiological nature designed to study factors associated with boll shedding.

Detailed growth analysis was conducted to compare okra-leaf and standard-leaf cotton, and to determine whether the productivity of okra-leaf

cotton could be increased with closer row spacing and higher nitrogen levels. The two types gave similar yields, but the beneficial aspects of okra-leaf were clearly demonstrated, particularly in respect to leaf area index, photosynthetic efficiency, and relative fruitfulness.

The shading trials started in 1970/71 were continued in an attempt to study the effect of shade duration on the growth and fruiting of cotton, with particular reference to boll shedding. It was shown that shedding was increased in all the shaded treatments in proportion to intensity and duration of shade.

A comprehensive growth analysis was conducted on Deltapine 16 in order to standardize growth patterns under two nitrogen regimes, and to determine optimum leaf area index in relation to crop growth rate and boll growth rate. Information was also obtained on the rate of boll development in relation to boll age and position on the plant, as well as on the rate of morphological development with particular emphasis on node production.

Trials were continued to study the effects of CCC in reducing the growth of potentially rank cotton; in spite of growth differences, all treated plots gave reduced yields. Other work on cotton included studies on skip-row spacing systems, nitrogen levels and times of application, the effects on yield of reduced plant stands, and defoliation trials.

At Salisbury Research Station examinations of chemical disease control methods in groundnuts continued in collaboration with the Branch of Plant Protection.

Groundnut research in the lowveld was confined to variety trials conducted on behalf of the Legume Breeder at Salisbury Research Station, as well as trials to study fungicidal control of leaf diseases.

Yields proved to be slightly lower than experienced during the two previous seasons, due largely to rapid growth and development induced by the hot season.

With adequate disease control measures the Natal Common types have proved superior to the Valencias, and better adapted to lowveld cropping cycles and rotations than late-maturing varieties such as Makulu Red. Disease control studies have enabled firm recommendations to be made in regard to optimum concentration and frequency of application of fungicides.

Variety trials on soya-beans were continued, but difficulties were experienced in establishing satisfactory stands during particularly hot weather. Subsequent investigations showed that seed mortality was high in hot soil between planting and irrigating, and that it was necessary to plant into damp soil to overcome the problem.

There has been a small and justifiable expansion to 0,8 ha of pyrethrum. Two Kenyan hybrids are being grown under observation.

In an irrigation trial on pyrethrum the highest yield was obtained from a treatment which was irrigated frequently (an $E_f : E_o$ ratio of 0,8) as well as applying a side-dressing of ammonium nitrate. The total yield for the period 1st August, 1972, to 31st July, 1973, amounted to 1 728 kg of dried pyrethrum flowers per hectare, which represents a gross return of $725 per hectare.

At Salisbury Research Station, following the granting of an additional post, work was begun on sunflower varieties, and at Makoholi work was continued on this crop. In the lowveld, work was started to investigate the potential of linseed as an irrigated winter crop; high yields were recorded in spite of harvesting difficulties.

Weed biology studies at Henderson Research Station included those on seed longevity and of the effect of various storage conditions on seeds of *Avena fatua*, *Acanthospermum hispidum*, *Rottboellia exaltata*, *Portulaca oleracea*, and *Urochloa* sp.

In a Nutgrass (*Cyperus esculentus*) Competition Experiment, an over-all season-long infestation reduced maize grain yield by 8, 12 and 28 per cent. on two clay-loam and one sandy soil site, respectively.

A number of combinations, mixtures and individual herbicides were compared in the herbicide evaluation programme. Field observations on the effect of atrazine on weeds following various methods of minimum tillage (wheel-track planting and stubble mulching) indicated that these practices had little effect on the efficiency of this herbicide.

Cotton, direct-seeded into reverted clay and sandy soil, gave yields comparable with conventionally tilled plots.

Off-station trials met with mixed fortunes in the extreme drought. However, 21 herbicide trials yielded further information on weed control and discussion groups were held at six irrigated sites.

In the lowveld, herbicide trials were continued on a wide range of crops on all three soil types.

CROP PHYSIOLOGY

At Salisbury Research Station crop physiology studies continued on the production and apportionment of dry matter in maize in an attempt to understand barrenness in stressed maize, particularly under crowded conditions. A relationship between maize yield and rainfall was developed which showed that the yielding potential over the traditional cropping areas as determined by rainfall regimes is almost double the average yields achieved by farmers. This calls for advance in technology of maize growing as applied by farmers.

The pod setting phase of ground-nuts was shown to be excessively long with resulting wastage. This was associated with an ample supply of early flowers but a low rate of success from flowers to pod. The lack of dormancy in the maturing seed is a cause of some concern in the quick maturing

varieties which are satisfactory in other respects of season length and yield.

In wheat further attempts to relate ear characteristics with temperature were made.

In its first season the Crop Productivity Unit conducted a programme of 38 trials on farms. For various reasons 10 of these trials were not reaped. Problems were encountered especially in handling wheat trials due to the lack of suitable equipment. Results from the trials have not been fully analysed but despite the very poor season a lot of useful information has been gathered.

Physiological work at Chiredzi was based on a study of the factors affecting yield of wheat at different planting dates, with particular reference to the relationship between temperature, spikelet initiation, and spikelet numbers.

PLANT BREEDING

Maize

The extremely low rainfall recorded in 1972–73 caused low yields in most maize trials and resulted in low precision of varietal testing. Information obtained from trials was valuable from the viewpoint that varieties were subjected to unusually severe stress, but the results must be treated with reserve because of the low precision of testing achieved.

Large scale field testing of the early maturing advanced experimental three-way hybrid 69 3WH 4 was carried out in 1972–73, and although no unforeseen problems were encountered, the unusual season provided inadequate information fully to assess this hybrid. It has, therefore, been decided to repeat the large scale field tests in 1973–74 before a final decision to release this hybrid for commercial production is taken.

Seed of the medium-late maturing three-way hybrid 71 3WH 11 and the medium maturing double hybrid 71 DH 1 was produced for field scale testing in 1973–74.

Despite the low yields achieved in the 20 District Maize Variety Trials in 1972–73, the repeatability of the regression lines calculated in previous years was clearly demonstrated.

Progress in six Recurrent Selection programmes and one Convergent Improvement programme has been made and evaluation of one cycle of selection in the two lowveld composites will be made in 1973–74.

The lowveld maize breeding programme was continued satisfactorily on all three Stations, and successful variety trials were conducted at Chiredzi and at Sabi in which 49 entries were tested at each site.

Wheat

In the wheat breeding programme 69 segregating populations were handled using the modified pedigree system, with the F1, F3 and F5 generations being grown in Summer and the F2, F4 and F6 generations being grown in Winter. The populations in F6 were grown at Salisbury and Chiredzi, and selections were made at both sites.

Several new crosses were made using high yielding local material and foreign introductions showing resistance to stem rust.

Two preliminary variety trials were grown at Salisbury, each containing 49 varieties of which several show promise.

The lowveld variety trial which contains the best of the material selected in the Lowveld was grown at Salisbury Research Station to evaluate this material under highveld conditions.

The international yield nursery containing 49 varieties was maintained.

The advanced variety trial planted at 13 sites throughout the country contained 25 varieties. Six varieties which had shown promise in the 1972 advanced trials were bulked for possible release in 1974.

Barley

The Barley Advanced Variety Trials were conducted at three sites, Salisbury (Gwebi Variety Testing Centre), Mushandike and Chiredzi, to evaluate the yield potential of 16 varieties. Eleven foreign introductions were bulked and underwent quality evaluation. Those showing promise will be included in 1974 Advanced Variety Trials. Small bulks were planted of several other foreign introductions.

Cotton

The cotton breeding programme consisted of three main parts:

The Medium Staple Middleveld programme at Gatooma Research Station;

The Medium Staple Lowveld programme at Sabi Valley Experiment Station;

The Long Staple programme at Chiredzi Research Station.

All three programmes functioned well despite the effects of the severe drought. None of the trials was abandoned and most proved very successful.

Single plant selections were made for the first time from the Transfer Generations. Other single plant selections were taken from seed bulks giving a total in all of 1 500. All of these were screened in the Fibre laboratory and promising material will be used in the appropriate programmes. Screening of all material for *Xanthomonas malvacearum* resistance was initiated. The inoculation techniques have been improved to obtain satisfactory results.

The need for self pollination was greatly emphasized in an out-crossing experiment. The percentage out-crossing between rows was shown to be as high as 22 per cent., in spite of heavy insecticide applications throughout the growing season.

The first release from the Long Staple programme was made, the seed is to be known commercially as No. 200.

The grain sorghum breeding programme was continued. A trial containing a number of selected locally developed experimental hybrids was grown. Seed of these and other hybrids was produced for future use.

Progenies from a pedigree selection series were grown in yield trials in order to obtain data for eliminating the less productive progenies.

The first generation of selection was carried out in two populations composited for recurrent selection. Trials of Red Swazi selections were carried out with the object of reducing the number of selections to the point where trials at different sites can be started.

Groundnuts

Progress was made in building up the groundnut breeding programme. Intercrossing and backcrossing of 25 pairs of varieties was carried out, during summer and winter. Segregating populations from eight crosses were grown at Salisbury in summer and at Chiredzi Research Station in winter. This was the first groundnut nursery to be grown at Chiredzi during winter and by establishing it in early March good seed set was obtained. A small number of new introductions and selections was observed and a new set of 123 South American lines was introduced.

Preliminary variety trials of early and late maturing varieties were continued and advanced variety trials of the two types compared the performance of 16 varieties at eight sites in each case. An early maturing variety "Valencia R2" was released for commercial production. Natal-type varieties were compared at Makoholi and Chiredzi.

Soya-beans

Soya-bean crossing was continued with 36 new combinations being attempted. The segregating progeny from 90 crosses were grown in summer and about 2 000 single plant selections were taken from those in advanced generations. A winter nursery of 64 segregating populations was established at Chiredzi Research Station in May, 1973. About 1 800 single plots of selections and new introductions were observed and 360 of these were retained for more critical evaluation.

Six preliminary trials were carried out on 270 new lines and intermediate trials at four sites gave information on 45 lines brought forward from the 1971–72 preliminary trials. Advanced trials at 13 sites were conducted, one variety from these has been released and is named "Oribi".

Potatoes

The potato virus testing scheme suffered a severe set-back in mid-December when baboons totally eliminated all virus tested stocks of the commercial varieties at the Pungwe field. As a result of this no breeders' seed was released to the Rhodesia Seed Potato Association.

Seven hundred tubers grown from seedlings were planted at the Mare field and 70 were retained for further observation after lifting. A further 700 seedlings were raised in the aphid-proof greenhouse on the Rhodes Inyanga Experiment Station.

A summer and a second irrigated yield trial were conducted on the Salisbury Research Station giving satisfactory results.

HORTICULTURE

At Chiredzi the banana trial completed its third bearing cycle and some of the earlier results were analysed. A seasonal growth habit was markedly reflected in leaf production rates, bunch masses and their time to maturity. The winter period affected all these variables unfavourably. Wider spaced plants cycled quicker and had better quality bunches. There was a similar response to increased nitrogen applications. Bunch quality also responded favourably to applications of potash.

Pecans, macadamias and litchis bore their first small crops. Grapes and mangoes continued to bear well. Issor and Seneca were assessed to be the most promising grape cultivars, and Haden, Zill and Smith the most promising mango cultivars.

A coffee planting under shade trees was established, as well as a nitrogen trial on pineapples. No vegetable research was undertaken.

At Grasslands Research Station considerably more attention was devoted to development work than in the past. About eight hectares of contact soil and sandy loam soil typical of the Marandellas series was stumped during the year and priority is being given to this development for Horticulture and Crop Research.

At Henderson Research Station a range of cultivars of various types of cucurbit were grown for evaluation. Several herbicides for peas were tested, and studies involving uniformity of maturation of brassicas were continued. The use of drip irrigation techniques resulted in significant water saving without loss of yield of several crops.

At Rhodes Inyanga Experiment Station introduction of new deciduous fruit cultivars from abroad was accelerated. A total of 72 cultivars comprising apple, apricot, peach and pear from sources in the Middle East, Western Europe and North America were imported and are growing in open (Inyanga) or closed (Salisbury) quarantine. The stone fruits will be tested at Grasslands Research Station in the first instance, the pome at Inyanga.

Ad hoc experiments on the propagation of apple rootstocks by hardwood cuttings, and more rapid production of apple, apricot and peach seedling stocks, continue. A promising borehole was sunk to provide nematode-free water for nursery work in the event that our present dam supply becomes contaminated. Propagation material of berries, scions and rootstocks was distributed on an increased scale.

Apples, plums and raspberries were supplied to local processors for canning and freezing tests,

and a fresh fruit "apple consumer preference survey" was conducted among Salisbury housewives.

For the first time in many years an infestation of apples (Golden Delicious) by a fruit fly (*Pterandrus rosa*) was recorded at the Station. In the spring of 1973 woolly apple aphid was noted on the "resistant" rootstock MM.106: an event paralleled in Australia and South Africa about 10 years ago.

At Chipinga Experiment Station the coffee artificial shade trial has once again produced consistent data to support previous findings on the effects of different levels of shade on biennial bearing, yield and quality of coffee.

N.P. (K) Trial gave significant yield responses to applied N and provided useful foliar analysis correlations.

The Zinc/Phosphate Trial produced no significant results.

The Management Trial continued to produce significant and important results on several aspects of management including mulching, pruning, the use of shade and different levels of applied N, as well as a considerable amount of ancillary physiological information.

The annual soil and leaf analysis survey of the coffee farms continued for its sixth consecutive year.

Useful correlations are emerging from the data obtained.

A wide range of short term physiological investigations into various environmental and management parameters affecting growth and development have been undertaken. As a result of this work a clearer picture of the growth responses of the coffee plant is developing, and important guide-lines are being established which will help to provide a sound physiological basis for crop production.

A programme, including field trials to determine the timing and frequency of fungicide applications for the control of coffee leaf rust and cercospora disease, was started. A survey of all coffee farms has been carried out to gauge the distribution and importance of Fusarium Bark Disease. As a result of the tragic death of Mr. Parkin on 4th March, only the leaf rust spraying trial is being continued. Important and significant information has already been obtained from this trial.

A crop improvement programme was begun with the importation of three separate batches of material from Oerias, Portugal and Angola, respectively. The first two importations have been released from quarantine and are planted out on the station.

Chipinga Experiment Station continued to be the principal supplier of seed to the industry.

This station continued to co-operate with the Malawi Tea Research Foundation in the supervision of two N.P.K. trials at Southdown and Ratelshoek estates, respectively.

Also current are four departmental zinc trials at Southdown, Ratelshoek, Aberfoyle and Eastern Highlands. Significant responses are being obtained from foliar applications of zinc as opposed to soil applications.

Tea work on the station is confined to propagative work and an area of seedling tea has been top-grafted with improved clonal material for ultimate distribution to growers.

DIVISION OF LIVESTOCK AND PASTURE RESEARCH

Animal nutrition

During 1973 the series of experiments at Henderson Research Station studying changes in marginal efficiencies of steers during fattening with H.E. diets was continued with 70 light (175 kg) weaners. The performances of these light and small animals was very good and the changes in marginal efficiency followed a similar trend to other age groups studied previously. Other work included a further experiment with 88 Africander steers where the problems of laminitis was studied and also 27 crossbred steers were used to test a new product. The incidence of laminitis was irregular but, in general, was more common in steers fed with large amounts of concentrate (maize). There was also evidence of genetic involvement. The new product did not improve efficiency of food utilization of fattening steers. The body composition of Aberdeen Angus and Mashona steers was compared at similar carcass masses and unit gain in dry matter was found to comprise almost identical amounts of fat, protein and ash, despite large differences in conformation of the animals. The study involving three different mineral licks and 72 Mashona cows continued and still no real differences are apparent between treatments.

Further studies with sheep (pregnant ewes) grazing on Stargrass pastures heavily fertilized with nitrogen during the summer were done. The birth of "stiff lambs", reported previously, appears to be restricted to those born in Autumn and the element selenium appears to be incriminated in the incidence of this syndrome.

Beef production

Various systems of beef production are being investigated at Grasslands with breeding cows on planted pastures in summer and rested veld in winter, or veld only the year round, both with and without protein supplements in winter. There are 240 cows in the system with 600 ha of veld and 40 ha of planted pastures available to them.

The livemass gains of the animals on pasture in summer have generally exceeded those on veld only, while those receiving supplements in winter have lost less livemass than those without.

The animals were mated at three years of age and are in the process of calving as four-year-olds. The pregnancy diagnosis has indicated that 93 per cent. of the veld-reared animals have conceived while 84 per cent. of those on pastures have conceived.

In each case there was a slight response to protein supplementation during the winter.

In trials on supplementary feeding, three different sources of protein supplements were compared in young steers grazing veld in winter. Four groups of 15 animals received either:

1. No supplement.
2. 450 g cottonseed meal daily (30 per cent. C.P.).
3. 450 cubes daily with 4 per cent. urea (30 per cent. C.P.).
4. 450 g weaner blocks daily with 3 per cent. urea (30 per cent. C.P.) throughout the winter.

The animals then grazed veld only in the summer and were pen-fattened the following winter to the same pre-determined final mass.

The livemass changes of the three supplemented groups were similar during the first winter and these groups required shorter feeding periods to achieve the slaughter mass than the unsupplemented group. The cost of a winter supplement was thus saved during the pen-fattening period.

At Matopos Research Station studies concerned weaning of beef calves at ± 9 months compared with conventional weaning at 6–7 months under supplemented and winter supplemented range conditions were concluded. Calves weaned late from unsupplemented groups were 25 kg heavier than conventionally weaned calves at the same age. Differences in weaning date did not affect calf mass to nearly this extent among supplemented animals. However, when supplementation was practised, this facilitated earlier calving and these calves were some 50 kg heavier at weaning than calves from unsupplemented groups. Late weaning did not affect cow reconception rate.

From a recent study of cow size and efficiency in the long term genotype x environment interaction project at Matopos Research Station, it became apparent that month of birth of calf influenced subsequent reconception. Cows calving early in the season have a greater chance of re-conceiving than those calving later. Among fed groups, cows calving in October had a reconception rate of 81,4 per cent. compared to 69,9 per cent. for cows calving in December. Sixty-one comma eight per cent. of not fed cows calving in December reconceived, whereas the comparable figure for those calving in February was 46,1 per cent. Heavier cows reconceived more readily than did lighter animals, and this trend was most apparent among cows calving late in the season. Post-partum mass gain influenced reconception rate particularly among lighter dams.

At Makoholi Experiment Station the examination of cumulative responses to phosphate feeding in breeding cows was concluded in 1973 after the eighth calving season. Responses were similar to previous years, cows supplemented with bone-meal showing superior nursing abilities with a 20 per cent. advantage in weaning production over controls resulting.

In a comparison between summer supplementary feeding and conventional winter feeding of breeding cows, differences in performance of dams are still small after four calving seasons. Calves weaned at nine months of age were some 12 kg heavier than those weaned at six months of age. The trial comparing the productivity of cows first calving at two years versus three years was also terminated during 1973. The individual productivity of cows in the younger group had equated with that of the older group after their third calves, with the pregnancy rates being similar with their third and fourth matings.

An evaluation of the free choice system of mineral supplementation showed it to have no advantage over conventional mineral supplementation to steers. A preliminary examination of a system of fattening steers on veld in the late summer was also started and continues.

Thirty-three Mashona bulls were performance tested for Mashona Breed Society members and performance test evaluation, in which the progeny of "high" and "low" rated bulls are assessed, continued.

Dairying

In contrast to the previous year, the year under review has been an extremely difficult one for the dairy farmer on account of the severe drought. Crop failures, sparse grazing, and lack of conserved roughage has presented serious problems.

In spite of these difficulties, dairy farmers succeeded in increasing milk production by approximately 12 per cent. over the previous year and this, together with improved compositional quality, indicates an improvement in feeding and management standards. Of the 10 194 compositional quality tests carried out on farm milk supplies, 81 per cent. satisfied the legal standard for solids-not-fat content, a significant improvement over figures in recent years.

The average quality of milk consigned to the D.M.B. dairies was good, averaging for the year over 3,8 per cent. butterfat content at all centres, and over 8,7 per cent. solids-not-fat content at Bulawayo. Gwelo and Gatooma, and 8,65 per cent. at Umtali and Salisbury.

Hygiene of farm milk production was well maintained and of the 10 194 samples examined by the official Methylene Blue Reductase test, 83,6 per cent. satisfied the standard, a figure which compares with those of preceding years.

Producer prices increased during the year under review, and the average pay-out, including quality bonus and supplementary payments, was 7,18 cents per kilogram. The figure for 1971–72 was 6,71 cents per kilogram. Bonus payments on compositional and hygienic quality averaged 0,33 cents per kilogram, more than two-thirds of this being paid for hygienic quality.

There is a need for reducing this disparity without impairing hygienic quality. Legislation introduced in July, 1973, giving an added premium for supplies exceeding 8,5 per cent. on solids-not-

fat content, was a step in the right direction, and it is hoped that this will not only provide the incentive for better compositional quality milk, but indirectly improve feeding standards and productivity of our dairy animals.

Other modifications introduced in the legislation referred to prescribe penalties for sub-standard milk which includes supplies containing antibiotics or is of inferior hygienic and compositional quality. Such milk is not required by the industry and can be responsible for substantial financial losses, particularly in the cheese and cultured milk manufacturing sections of the industry.

The improved producer prices reflect the continued success of the Dairy Marketing Board in the marketing of their products, particularly those giving a high realization value, notably whole milk sales. Sales of the latter improved by 9,5 per cent. over the preceding year, and the expansion of 21,6 per cent. in the African market was a noteworthy achievment as this market offers an attractive potential.

Sales of other products such as cheese, yoghurt, cream, ice cream, showed substantial gains, and sales of Lacto, depressed by the price increase of June, 1971, have now recovered.

The quality of the Board's products was again reflected in the success of their entries at the Rand Easter Show. Twenty-five prizes were gained, and the award of the Weddel Trophy and N.C.D. Challenge Cup for Cheddar Cheese exhibits was an outstanding achievement.

Investigations on the somatic cell counts of farm milk supplies consigned to the Salisbury Dairy continued. Counts were on the high side as compared with United Kingdom figures and whether this is due to the higher incidence of mastitis, or other factors, remains to be resolved.

Studies on calf mortality referred to in last year's report have continued in greater detail, but have yet to be completed. Information so far indicates that dairy farmers are endeavouring to rear a high percentage of heifer calves born, but that mortality rates are high, the first week of life being the most critical period.

In so far as milk recording is concerned, figures show a steady improvement in average lactation yield per cow. The average for all breeds was 3 879 kg, an increase of 71 kg over 1971.

In the Official and semi-Official Schemes, Glenara Estates headed the list of participants with an average production per lactation of 7 203 and 7 447 kg respectively, the latter establishing a new record.

In the Milking Competitions for milk and butterfat production from the best 15 cows in dairy herds, Glenara Estates won both competitions. Average lactation yield was 9 681 kg in the milk competition and 365 kg in the butterfat section. Runners-up in the milk competition were N. H. Evans and L. McLean, and N. H. Evans and S. P. Baxter in the butterfat section.

The above clearly indicates that very high levels of production are attainable in this country, and provided resources mainly in the form of food, and the management expertise of our leading dairymen is practised generally, there is no doubt that the average production of our national herd could be improved substantially.

Fish

At Makoholi, due to the good rains during the 1971–72 season, water was plentiful. Eighty-eight thousand fingerlings were produced for stocking public water and farm dams.

The fisheries section at Henderson was mainly engaged in fry production and doing advisory work.

Sheep production

At Matopos lamb mortality among 1 327 lambs born 1965–72 was 11,9 per cent. Of these deaths, 20 per cent. were accidental and over 60 per cent. were due to starvation, especially where twins and two-tooth ewes were involved. Less than 6 per cent of lambs died from disease. Two-thirds of all deaths occurred before the lambs were 10 days of age.

The sheep unit at Grasslands is designed to study wool and mutton production from heavily fertilized dryland pastures and comprises 11 ha of No. 2 Star Grass, which is rotationally grazed during the growing season, by 300 Mutton Merino and Dorper ewes. During the dry season the animals graze maize stover and are given maize silage ad lib and small amounts of cottonseed meal. Lambs are dropped in late-September and October and ewes are "steamed" on a ration of maize and cottonseed meals from six weeks prior to lambing. They are fed until the grass comes away in early December.

Lambing per cent. during the year was 117 per cent. and total lamb losses were 13 per cent. The lambs were weaned at a livemass of 27 kg and then fattened on high-concentrate diets for sale at 36 kg livemass for Dorpers and 45 kg livemass for Merinos.

The blance sheet for the year reflected a loss of approximately $270,00.

At Makoholi Experiment Station the comparison between Sabi and German Merino sheep was concluded with a cross-mothering study. Results indicated only small differences between the milk yields of the two breeds despite the smaller size of the Sabi ewe.

In view of their inferior production under Makoholi conditions, the flock of German Merino ewes was disbanded.

Veld and pastures

At Grasslands Research Station, in a series of pot trials, the emergence of four pasture legumes under varying degrees of moisture stress was examined. Although emergence was usually reduced by moisture stress, the seeds did not appear to be harmed by the stress treatments and, after adequate moisture had been applied at the end of each trial, total emergence was comparable for all moisture treatments. The effect of moisture stress

in reducing emergence was greatly alleviated by a mulch, especially on a crusting soil.

Pot studies on the effects of defoliation on herbage plants should help in the prediction, or in the understanding, of the reaction of these plants to defoliation in field situations. Similar treatments were applied to the veld grasses *Hyparrhenia filipendula* (Thatching grass) and *Heteropogon contortus* (Spear grass) and to the legume *Stylosanthes guyanensis* (cv Oxley fine-stem) established in pots. *Hyparrhenia filipendula* was the most resistant to defoliation. Cutting height had little effect but yields and vigour were greatly affected by cutting frequency. The other two species were affected by both height and frequency of cutting. Effects of the treatments on root mass at the end of the experiment were even more pronounced than the effects on herbage production. Similar treatments will be applied to stands of *Hyparrhenia filipendula*, grown alone or with legumes, to test the extent to which the results obtained under field conditions follow the trends observed in pot trials.

Information on the performance of animals grazing legume-based pastures is accumulating. At Henderson Research Station steers on *Desmodium intortum* pasture at a stocking rate of 0,8 ha/head gained at a rate of 0,8 kg/head/day throughout the summer and all the steers graded Chiller 1 when slaughtered in May. On Townsville stylo near Shamva weaners stocked at rates of 1,3 and 2,1 ha/head gained 0,69 and 0,75 kg/head/day for a 27-week period during summer. In both cases, though, the stock did little more than maintain livemass, during the mid and late dry season.

At Grasslands Research Station a recently established irrigated pasture of Bushman Mine Panicum (*Panicum coloratum*) mixed with Kenya white clover (*Trifolium semipilosum*) and *Lotononis baisnesii* was stocked during the mid and late growing season at a rate of just over 2 000 kg/live mass/ha. Livemass gains without supplementary feed were about 1 kg/head/day.

The drought considerably reduced animal and herbage production from dryland pasture at Henderson, but less severely than it affected production from dryland annual crops.

In management studies, herbage production from Star grass (*Cynodon aethiopicus*) cv No. 2 grazed whenever it was 10 cm tall increased as amounts of nitrogen applied increased up to 800 kg/ha. There were 25–31 days between grazings. When grazed to leave a stubble of 5; 15 or 25 cm tall, Star grass produced most herbage when reduced to 5 cm at each grazing.

Steers on Star grass gained 1 260 kg/ha of carcass-mass when grazing at 20 head/ha and fed 3 kg of a maize-concentrate supplement each, daily. When grazing at 12 and 20 head/ha without supplement, their carcass-mass gains were 415 and 356 kg/ha respectively. Gross margins for these gains were $221, $60 and $31 per ha respectively.

At Matopos veld work was directed at the productivity of sandveld, redsoil ecology and associated harvester termite problems, and to bush control.

In a comparison of systems of grazing management involving 16 or four paddocks per head at Nyamandhlovu using single herds of comparable breeding cows in each system, no differences in animal productivity have occurred after weaning five calf crops. The analytical grazing trial in progress on Matopos sandveld showed similar trends to those of 1971. During the growing season, long grazing periods (20 days) are giving lower steer livemass gains than 10 or five day grazing periods, and eight paddocks are giving lower gains than four paddock procedures. There is evidence that the rapid rotation of five and/or 10 day periods of stay in a four paddock system provides more nutrition herbage than that produced in other treatments. As might be expected, the higher stocking rate (2,2 ha/steer) results in higher livemass gains/ha. Individual animal performance during the growing season was similar at both stocking rates, but during the dormant season the animals stocked at the lighter rate fared better.

Work was initiated with the over-all aim of defining those factors responsible for redsoil instability. Degraded patches in several sites have been subject to soil moisture, infiltration, herbage yield and basal area measurements. These studies have served to describe the general relationship between moisture penetration and herbage cover on redsoils and the reduction in both on degraded areas. Together with an attractive hypothesis concerning the invasion of the harvester termite, *Hodotermes mossambicus*, these relationships provide the basis for degraded area manipulation studies. In addition, reclamation work on redsoils has been established in five Intensive Conservation Areas to provide information on procedure and economics of redsoil reclamation.

A bush control research programme was also initiated in 1973, with the accent on a systematic approach to chemical control. Work has commenced on the species *Brachystegia spiciformis*, *Julbernardia globiflora* and *Terminalia sericea* using three sites for each species. The sites are at Fort Victoria, Chatsworth, Lalapanzi, Selukwe, Balla Balla, Inyati and Turk Mine.

At Nuanetsi Experiment Station an experiment covering 420 ha designed to assess the effect of cattle production on killing the larger trees by ringbarking in lowveld woodland was initiated during the year. Provision is made for application of three stocking rates in untreated and ringbarked veld respectively. In the initial stages before the ringbarked trees die, all treatments will be stocked at the same rate. The botanical composition of both the herbaceous and woody components of the vegetation has been measured. Feeding habits and the botanical composition of the diet are being recorded by observation in the field.

The facilities required for an exploratory study of the potential production of goats in lowveld woodland have been installed, and the animals will be introduced shortly. Initially, it is planned to study the feeding habits and pattern of move-

ment of goats which are kraaled overnight at a water point, and allowed to feed during the day.

After a long delay in the provision of irrigation water, sufficient water is now available to irrigate a small area. Accordingly, grass and grass-legume pastures have been established on 2,5 ha. These will be used in preliminary assessments of carrying capacity and productivity.

The Rhizobium Laboratory and Inoculant Factory

Due to lack of staff, the Rhizobium Laboratory at Grasslands has been on a care and maintenance basis for the whole year. Routine culture transfers have been made and the Inoculant Factory has been supplied with all cultures needed for inoculant production.

Inoculant production proceeded satisfactorily during the year and sales were higher, by 16 062 units, than in the previous year when they were severely limited by a shortage of soya-bean legume and, of the 39 002 units sold or issued free, 28 664 were for soya-bean and 5 650 were for groundnuts. Most of the remainder were for lucerne, field or garden beans, or peas.

SPECIALIST BRANCHES DIVISION
BIOMETRICS BRANCH

Advice on the planning of research projects with annual and perennial crops and with livestock, has again been provided, and data from a very wide range of trials has been statistically analysed. A survey of the computer time usage through a three year period shows that the main analytical effort of the Branch has been devoted to cotton (28 per cent.), with maize (18 per cent.) and coffee (12 per cent.) also being major receivers of the service. Livestock work, excluding the Beef Performance Testing Scheme, accounted for some 10 per cent. of the work load and no other commodity accounted individually for more than 5 per cent. of the Branch's computer time usage.

Specific research projects, to which considerable effort was devoted during the year, included a detailed examination of time trends in foliar analysis and inter-relation with yield in coffee. The study of problems in sampling and estimating pest populations, particularly in cotton, was continued and further studies on variability in the liveweight of beef cattle were undertaken. The model-building study for relating rainfall and evaporation to soil moisture variability and thence to maize yields also recommenced.

The assistance of Air Rhodesia Corporation in providing the Branch with time on their I.C.L. 1500 Computer is again gratefully acknowledged. The arrangement, which commenced in 1968, has always worked very satisfactorily, but it became apparent during the year that the total work load on the computer was steadily increasing, and time availability for Branch usage consequently became more limited. The situation was slightly alleviated by the Department of Conservation and Extension accepting full responsibility for analysing the results of the Beef Performance Testing Scheme on another machine, but even this saving of 18 per cent. in the Branch's computer time usage served only as a temporary relief.

These difficulties in computer time availability, caused a reappraisal of the functions of the Branch. As a result, much effort has been placed during the year on initiating the development of a new computer based statistical analysis system. It is intended that this new GESTALT system should be, as far as possible, not specifically oriented to one computer, as is the current ARC/02 system, thus providing greater scope for purchase of computer time. Experience gained with ARC/02, over a period of 10 years, and with other schemes, is being used to develop GESTALT with greater power and flexibility, but primarily with greater ease of operation. The intention is that the system should be usable by individual research workers, with guidance by Branch personnel, to perform the more routine design analyses, which have always been a major part of the work load of the Branch. In this way, throughput of work should be hastened and should more rapidly expand, and at the same time will be relatively independent of the personnel situation in the Branch. Moreover, the Biometricians in the Branch will then be able to concentrate on specific research projects where the impact of their specialist knowledge will be much greater.

Development of GESTALT is proceeding slowly but satisfactorily, and the difficulties attendant to such a major change of computer system are being overcome. In spite of the division of effort within the Branch, it has been possible to maintain a reasonable balance between development and production work, and it is gratifying to report that, particularly in the evaluation of annual crop results necessary for planning next year's trials, the throughput of work has been greater and faster than ever before.

BRANCH OF CHEMISTRY AND SOIL SCIENCE

The general analytical laboratory, which provides a service to research stations and the industry generally, has again increased its output (by 10 per cent.), mainly owing to increased analysis of plant materials for research stations.

Continued analytical assistance has been provided to the Plant Protection Branch in its investigation of the persistence of pesticide residues in crops and soils, and the first steps have been taken towards establishing a pesticide residues laboratory, which will enable systematic work to be done on the incidence and persistence of residues in both animal and plant materials.

In collaboration with Matopos Research Station the seasonal variation in toxicity of *Dichapetalum cymosum* (umkauzaan) has been investigated. Since no satisfactory method for determining the toxic principle (sodium monofluoracetate) apparently exists, considerable effort was expended in developing one.

Good progress has been made in the study of mitochondrial activity of maize genotypes. Diffi-

culties experienced in the isolation of mitochondria and measurement of respiratory activity have been systematically studied and overcome, and work is continuing on measurement of the activities of hybrids and their in-bred parents. Assistance has again been given to the Crop Production Division in the use of radioactive carbon dioxide for measuring photosynthetic efficiency, but results with this technique have continued to prove disappointing.

The annual survey of the incidence of aflatoxin in the national ground-nut crop has shown an appreciably higher level of contamination than in any previous season. This is attributed to the drought, since in previous years a clear tendency has been observed for aflatoxin contamination to be more severe in seasons of low rainfall. However, monitoring of other stored products has continued to show little contamination.

The soil advisory service issued recommendations based on analysis of 4 726 soil samples—an increase of 14 per cent., on the previous year. Requests for advice on tobacco and oil crops increased sharply, and there was also a marked rise in the use of the service by African farmers. The analysis of soils for scientific purposes remained static at 3 183 samples.

In support of the soil advisory service, experiments were conducted on farms to investigate the response of maize to zinc and boron, and of ground-nuts to nitrogen, boron and lime; two long-term trials on coffee in the Vumba were continued. In addition, four new coffee trials, two in the Vumba and two at Chipinga, were laid down to investigate the possible response of coffee to foliar applications of zinc.

The study of the nutrition of coffee and apples by means of foliar analysis has continued at the same level as in recent years, and 450 cotton leaf samples have been analysed as part of an investigation by Gatooma Research Station into the feasibility of using foliar and petiole analysis to predict the need for nitrogen top-dressings in cotton.

In continuing work on the structural stability of surface soils and problems of crusting, the soil physics section has again placed emphasis on development of techniques for evaluating the distribution of pores within crusts formed under simulated rainfall. Further modifications were made to the rainfall simulator.

A ground-nut irrigation experiment was conducted under automatically-operated rain shelters. Although the trial had a high coefficient of variation, some interesting results were obtained. While the benefits of adequate irrigation during the main podding period were demonstrated, a treatment that received only three irrigations from planting until towards the end of flowering was still able to exceed 4 t/ha of kernels. Lower yield was always associated with smaller kernels rather than with fewer pods per plant or kernels per pod.

In co-operation with the Crop Ecologist, an investigation into water loss from clay soils under different mulch treatments was carried out. It was also possible, with the co-operation of the Biometrics Branch, to continue investigations into a possible computer model to assess the type of moisture season that can be expected in different parts of Rhodesia.

There was a marked reduction in the number and extent of soil surveys undertaken at the request of other departments and ministries. The only soil surveys involving appreciable areas were a proposed extension of the Chisumbanje irrigation scheme, a broad reconnaissance of commandable land below the Lesapi dam, and a proposed irrigation scheme above the confluence of the Umwindsi and Inyagui rivers in the Chikwakwa T.T.L.

Research projects begun in previous years continued. The main one, a study of the constitution and genesis of soils derived from granite, is nearing completion and will be published. Monitoring of both soils and waters in connexion with work on the re-use of irrigation drainage water in the south-eastern lowveld is also continuing.

The long-term effects of irrigation on very permeable sandy soils of low available water capacity are being examined on a number of sites. These soils are prone to strong leaching and are not normally recommended for irrigation, although they are frequently included in schemes in both farming and tribal areas. Attention is also being paid to the use of bicarbonate-rich borehole waters of moderate salinity, which cause an appreciable rise in soil pH and a consequent decline in productivity.

In the Soil Productivity Research Laboratory the effects of lime and molybdenum on maize growth on acid reddish brown clays were compared in 10 field trials; both lime and molybdenum eliminated molybdenum deficiency, but lime was less effective than molybdenum in promoting plant growth. The effects of treatments applied to the parent crop on the molybdenum content of maize seed is also being determined in relation to pre-germination of grain on the cob and the carry-over of molybdenum to the commercial crop.

In the continuing investigation of zincated fertilizers for maize the residual efficiency of the carriers on limed and unlimed sands is being determined in trials that will run for three years. In other experiments, uptake of zinc by plants in the field and in pots is being studied in relation to the available zinc in the soil. Response to zinc in the early stages of growth may be related to available zinc, but yield responses are too dependent on climatic factors to be quantitatively predicted by soil analysis.

To consolidate research on sulphur fertilizers for maize, the absorption of sulphate by different soils and also the sulphur concentrations in maize plants of increasing age were determined. The inorganic sulphate content of leaf samples and the nitrogen/sulphur concentration ratios of the stalks promise to be good indicators of sulphur status, and the critical levels are being established.

The reasons for the short productive life of lucerne stands are being investigated in collaboration with Grasslands Research Station. Foliar analysis has shown that loss of vigour with normal fertilizer practice is associated with potassium deficiency.

Studies of the effect of cropping sandveld wetlands have been started with a survey of the organic carbon content, nutrient status, and fertilizer requirements for maize of a range of sites, and sites have been selected from them for further detailed studies.

Chemical analysis of soil samples from three co-operative long-term trials on depth of tillage have been completed. Laboratory determinations of soil strength, using a needle penetrometer on undisturbed cores at constant moisture levels, are in progress. Results confirm earlier field penetrometer findings of "hard" layers below the nominal ploughing depth, which are a major factor governing root development. A novel technique for measuring oxygen flux in soils has been developed for water-saturated soils and its application extended to unsaturated soils.

Twenty-five runoff lysimeters have been installed in the cotton-maize rotation trial at Henderson Research Station. Runoff in the cotton phase is demonstrably greater than under maize, and lysimeters are concentrated in the cotton phase. The effect on soil and water loss of mulching compared with ploughing-in of crop residues and of grazing the maize stover is being measured.

Work on the relationship of soil temperature to emergence of maize seedlings has been concluded and a report prepared for publication. Studies of the effect of soil compaction on emergence at different moisture contents have shown inhibition of seedling development in coarse-grained sands at bulk densities that commonly occur in the field.

Research on the interaction of boron availability and temperatures in their effects on maize production has continued, with emphasis on the reproductive phase of growth. Preliminary results indicate that the period of shedding of viable pollen and the synchronization of silking and pollen-shed are affected both by boron and by temperatures in the first four weeks of growth, and the threshold conditions for good pollination and seed-set are being determined.

NATIONAL HERBARIUM AND BOTANIC GARDEN

The extensions to the herbarium building has greatly improved working conditions but the full benefit will be felt only towards the end of 1973 when adequate cupboard space will be provided.

Over 6 500 specimens were incorporated in the herbarium, slightly less than in the previous year. The drop in number is not significant. More specimens are being received from Portuguese territories and less from Zambia and Malawi; this year there has been a rise in the numbers determined for Botswana. As part of the identification service, many thousand plants were named for the Department of National Parks and Wild Life Management, the Department of Education, the University of Rhodesia and the general public, but a very high proportion of these were not kept.

Some 10 000 duplicate specimens have been accumulated for distribution to other herbaria throughout the world. They will be sent in exchange for specimens and literature.

Co-operation with Portugal and Britain continues in connexion with the production of the *Flora Zambesiaca*. Many families and genera have been loaned to Lisbon, Coimbra, Kew, the British Museum, Munich and Lund.

An account of *Sacciolepis* has been completed.

Work on the *Astereae* was done in co-operation with Professor Wild and the typescript has been completed except for two genera that have been studied at Munich. The typescript of the *Helenieae* is nearing completion. Preliminary work on the *Rubiaceae* continues.

"A Rhodesian Botanical Dictionary of African and English Plant Names" was published in 1972. This is a revised and enlarged edition by H. M. Biegel and S. Mavi of H. Wild's original work.

Considerable progress has been made with the list of Rhodesian plants, and visits to Pretoria and Lourenço Marques have improved the accuracy of the list of woody plants.

Co-operation with Veterinary Research, the Medical School and the Chemistry Department of the University of Rhodesia continued in research into medicinal and poisonous plants. Over 250 African herbalists have been interrogated on the use of herbs and an impressive amount of information is now available on card indices, which is already proving useful in forensic work.

Several collecting expeditions were undertaken within Rhodesia. The most rewarding were to Mt. Buhwa, where a bamboo new to the country was discovered, and to the Haroni–Lusito confluence where 11 species not previously known from Rhodesia were collected.

National botanic garden

Progress in the development of the National Botanic Garden has continued satisfactorily.

New areas have been made park-like by the removal of rocks, levelling the ground and planting lawn. This extends the area of lawn to approximately 14 ha. A further 1 040 trees and shrubs, including a number of rare species, were planted in the various sections.

The excavation of the lake and the landscaping of the vicinity has been completed. There are initial sealing problems but it is hoped these will soon be solved so that filling may commence in the near future. Two boreholes were drilled and equipped for supplying water to the lake.

Fifty-four consignments of seed were sent to botanic gardens and research institutes in many countries. Several overseas and South African

research institutes were supplied with indigenous plant material, mainly for chemical investigation.

Numerous tours of the garden were conducted for schools, the university and various other interested societies. Ten lectures were given by the Curator on landscaping and indigenous plants. Public interest in the garden has increased considerably.

The National Botanic Garden Fund Committee met three times during the period under review. Committee members were active in enrolling new members of the Friends of the Botanic Garden as part of planned fund-raising. A total of $6 464 was raised in this way. There are now 235 ordinary members, 58 life members and three benefactors.

Ecology

In the Tuli Controlled Hunting Area, work was continued in co-operation with the Department of National Parks and Wild Life Management. Botanical recordings have been made in four trials plots in which the effects of excluding game and poisoning of harvester termites are being observed. Five exclosures were sited in different habitats with the object of observing the effect of protection from grazing and browsing by game animals on the vegetation.

Help was given in the selection of good examples of riverine vegetation near the Shashi River which should be preserved. Four areas were chosen, each different in dominant tree species.

Assistance was given to the National Trust of Rhodesia in naming trees and shrubs in the grounds of La Rochelle near Umtali.

BRANCH OF PLANT PROTECTION

Nematology

The lack of response to soil fumigation in maize was associated with a low *Pratylenchus brachyurus* population and this latter was considered to be due to seasonal or varietal factors.

Ground-nuts do not appear to be severely affected by *P. brachyurus*.

Trials are in progress using systemic nematicides on apples (*P. penetrans*), bananas (*Radopholus similis*), citrus (*Tylenchulus semipenetrans*), peaches (*Meloidogyne javanica*) and maize (*P. zeae*).

Thermotherapy resulted in potato tuber loss in storage and reduced yield when treated tubers were planted.

Pyrethrum appears to be highly susceptible to *M. hapla* but not to *M. javanica*, the common root knot nematode.

Phytotoxicity following methyl bromide soil fumigation appears to be a problem in relation to propagation from seeds and cuttings rather than bare root plantings.

Aphelenchoides besseyi has for the first time been found to survive in the soil between rice crops, and for the first time in Rhodesia, in the seed.

Plant Pathology

Coffee rust (*Hemileia vastatrix*) has continued to spread and now occurs on farms throughout the Chipinga–Melsetter area. Good control of rust has been achieved in trials and on farms by monthly applications of copper oxychloride, but severe leafloss and dieback have occurred where control measures have been inadequate.

Despite the generally dry climatic conditions during the growing season, good responses in yield of irrigated, late maturing groundnuts were achieved by fungicide spray programmes to control foliar diseases. However, contrary to previous seasons' results, the greatest responses were achieved by applications late in crop development.

In the first season following the introduction into soil of cotton debris infected with Verticillium wilt (*V. dahliae*), quantitative estimates indicated a rapid increase in the soil density of microsclerotia after cotton cropping, but little change after maize or fallow treatments.

Seed Services

The number of samples received for testing by the Government Seed Testing Laboratory represented an increase of 5,2 per cent. over the year 1971–72, making a cumulative total increase of nearly 50 per cent. over the last four years. Unfortunately, this expansion coincides with the loss of five experienced seed analysts and as a result, there were some delays in the reporting of analyses.

The drafting of a Plant Breeders, Rights Bill was completed. The purpose of this Bill is to provide for the registration of plant breeders, rights and the protection of the rights of persons who register them.

The drought caused many summer seed crops to grow very unevenly and certain fields, particularly of tobacco, were rejected due to poor growth and irregular plant height.

Following reports that plants of wild oat had appeared in areas other than known infested areas, extra precautions were taken to keep this noxious weed out of registered wheat seed crops.

Entomology

Swarms of red locust, *Nemadacris septemfasciata*, invaded the eastern border of Rhodesia in August, 1972, and were finally brought under control by mid October. The location of fledgling locusts in March, 1973, on the Buzi Flats led to a successful control operation of the swarming adults in July. In June a survey of other likely breeding places in Mozambique confirmed the presence of red locust throughout the central lowlands.

Larval behaviour of young cutworms elucidated in the laboratory was demonstrated in the field and could form a basis of a new approach to cutworm control.

Fenitrothion has been recommended as a replacement for lindane to protect seed grain from storage pests. Four insecticides were found to be suitable alternatives to DDT for the control of

tobacco beetle. If the limewash surface of tobacco storage sheds could be replaced by P.V.A. paint, then the number of suitable insecticides could be increased and the dosage rates reduced.

No replacements for aldrin or dieldrin were found as alternative soil insecticides to control termites and the dosage levels of aldrin and dieldrin could not be reduced below 1 kg a.i./ha for effective control.

Pesticide Registration

Pesticide registration continued with the approval of 426 pesticides for registration or re-registration and 60 experimental pesticides. A registration survey was conducted in Salisbury indicating that only 30 per cent. pesticide labels on the shelves were approved. A packaging survey indicated that some materials presently used for pesticide packing were unsuitable for this purpose.

Several consultative committee meetings were held and the secretary for the Hazardous Substances Control Board joined the committee. A policy for the future use of organo-chlorine pesticides was formulated.

Cotton pest research

A scheme for the rotation of acaricide usage was finalized and is to be implemented for the first time during the 1973–74 season. The scheme basically involves three groups of systemic acaricides, each to be used in any given area for a maximum of two seasons. The cotton growing regions of the country have been divided into six principal rotation areas for this purpose.

Provisional recommendations for the ground application of Ultra Low Volume sprays to cotton were produced on the basis of successful field trials at Gatooma and in African areas.

A new selective aphicide was recommended for use on cotton. Its use should help to avoid the danger of inducing chemical resistance in red spider mite populations which arises when broad spectrum insecticides are used for aphid control.

In a soil pests control trial, cotton seed which had been dressed with dieldrin wettable powder before planting gave significantly better protection against termite damage than untreated seed.

Monocrotophos tolerance was indicated for the first time for two *Tetranychus cinnabarinus* populations from the Mazoe Valley area.

Tetranychus urticae Koch. was positively identified for the first time in Rhodesia from roses in the Salisbury area. This was the first record of this potentially serious pest in Rhodesia.

Laboratory screening of pesticides was continued, involving tests of over 40 different formulations against one or more of the bollworms and against cotton stainers.

The life history and feeding habits of two species of coccinellid were studied in the laboratory. Both species are predators of aphids, while one of them also feeds readily on bollworm and leaf eater eggs.

The pink bollworm survey was continued. New site records were obtained from Chisumbanje, off cultivated cotton, and from south of the Sabi–Lundi river junction off wild cotton. Surveys were repeated over a wide area in Rhodesia and Mozambique in co-operation with the Portuguese authorities.

Investigations into scouting methods for bollworms were continued.

BRANCH OF AGRICULTURAL EDUCATION

In furthering the formation of a Rhodesian Joint Board of Examiners for the College Diploma Courses in Agriculture, the Chief of the Branch and the Senior Agricultural Education Officer have been co-opted to the Examining Boards of the two Colleges, while revised assessment procedures for and common standards of first class diploma awards and distinctions have been established in the hope of ensuring uniformity of performance for employers.

During the year under review, the Chief of the Branch was appointed as the departmental observer on the Advisory Councils of Gwebi and Chibero. Dr. D. H. Saunder, M.B.E., Assistant Director, Specialist Services, had been a member of both College Councils since 1964. This opportunity is taken to thank him for his sustained interest in and services to Gwebi and Chibero in particular, and Agricultural Education in general.

The Senior Agricultural Education Officer and staff concerned with Training, Publications and the Information Retrieval Unit moved into more spacious and re-designed office accommodation in the building formerly occupied by Plant Pathology section of Plant Protection Branch. Provision has been made for improved training facilities, particularly for In-Service participants while visiting Salisbury during their course, including better audio-visual aids.

The advice of the Branch was sought, and gladly given, in regard to the Ministry's award to the Colleges and Esigodini.

Gwebi Agricultural College

The College year began on the 5th October, 1972, with 82 students in residence and ended on the 6th July, 1973.

It was again possible to offer places to all qualified applicants and the demand for places at the College has shown no increase over the past few years. As the demand for qualified Gwebi diplomates is greater than it has ever been in the past, the lack of applicants for the Diploma Course is disturbing and more vigorous methods for recruitment will have to be adopted.

Forty-one members of Course 23 wrote their final examination and 36 were awarded a diploma of the College, of which six were first class; of the 41 members of Course 24, 39 were accepted for entry to the second year.

The College farm had a difficult year due to the low rainfall which was about half that normally experienced, but it provided the students with

experience in the importance of sound soil and crop management under low rainfall conditions. This important aspect of crop production was further emphasized during a student tour of the Midlands area.

Despite the low rainfall, the College water supplies have proved adequate.

Chibero Agricultural College

In common with most of Rhodesia, the College was severely hit by the disastrous drought. The total rainfall was only 386 mm, of which 39 mm fell before the main cropping season began. With only five storms of 25 mm or more there was little run-off and the College has been dependent on boreholes for almost the whole year. Strict rationing of water was introduced on 1st January, 1973, and will continue until a reliable source of water is available.

Despite the poor rains, yields of Burley tobacco, Virginia tobacco and Cotton were 2 738, 2 148 and 2 432 kg per hectare respectively. As much food as possible was conserved for the winter and the cattle herds reduced in number so that they could be maintained at a reasonable nutritional level until January, 1974, if this became necessary.

Jersey and Mashona cattle were successfully exhibited at the Gatooma and Salisbury Shows with Course 11 and 12 students preparing and parading the animals. The staff and students are to be congratulated on their presentation of the cattle which drew very favourable comments from many observers. With mastitis under control an improvement in the average milk yield was expected and occurred—400 kg per lactation.

Two more blocks of bachelor quarters were completed in the compound by the building section, and two kitchen blocks erected. A fitted work-room and fertilizer store were also built during the year. This enabled the Animal Husbandry section to ease the congestion in the feed store by taking over the old fertilizer store.

The College is grateful for the magnificent gift of equipment for a welding school presented by Messrs. Mobil Limited. This asset will greatly facilitate the instruction in welding, so vital on the modern farm.

Mr. and Mrs. J. D. L. Nicolle were the Guests of Honour at our well attended 10th Diploma Day Ceremony on the 19th July, 1973. Mrs. Nicolle presented the College Diploma in Agriculture and the St. John's Ambulance First Aid Certificates to the 18 third-year students of Course 10.

Three First Class Diplomas were awarded and 15 distinctions. The best all-round student of the year, Mandivamba Rukuni, who won the N.R.B. trophy, had a "full house"—a 1st Class Diploma with five distinctions. The Gibbs trophy was awarded to P. Paradza of Course 10.

The College Council, under the Chairmanship of Mr. Charles Murray, met at regular intervals during the year, and their help and guidance is gratefully acknowledged.

Esigodini Agricultural Institute

The season started with a fall of 34,0 mm of rain and light hail on the 1st October, 1972. This was followed by 37,8 mm of rain on the 6th October and heavy hail which did extensive damage to the lucerne, vegetables and fruit trees. All arable lands had been winter ploughed and after the hail storm ceased at 4 p.m. on Friday, the 6th October, 1972, there was a layer of hail about 100 mm deep which covered the whole farm. Eighteen and a half hours later, at 10.30 a.m. on Saturday, 7th October, there were still piles of melting hail in contour ridges and depressions all over the farm. On the 30th September, 1972, all dams were empty. On the 7th October, 1972, all the dams were spilling, with the exception of the largest dam in the centre of the farm which was just below full supply level.

The total rainfall for this season was 409,0 mm which was 242,30 mm below the 31-year mean for this station.

The major development projects completed by the students were the construction of a Dutch Barn 11 m × 22 m, the construction of two R.26 type labourers' cottages, which now brings the total to five semi-detached units and leaves only two more units for future construction to complete the labourers' village. Shelters were constructed in two of the dairy feed pens. The fabrication of a fly wheel housing and the fitting of a new engine to the hand rotovator and a three point hydraulic system for the old B.M.D. tractor were completed and put into use. 3,64 km of new fencing were erected, in the re-alignment of the fencing in four of the beef paddocks, into six paddocks, with water troughs, to make better use of the hill grazing.

The Ophir mine borehole was brought into use but the yield of water was disappointing. This borehole did not enter the stoped area of the mine and we are not drawing from this vast underground reservoir. This additional water supply enabled us almost to double the area under winter irrigation, but we could still double this again if we had the water. It is to be hoped that another attempt to tap the Ophir mine reservoir will be made.

Our Third Certificate Presentation was held on the 31st July, 1973. The certificates, trophies and prizes were presented by our Guest of Honour, Mr. W. A. Bailey, Chairman and Managing Director of TILCOR.

J. C. RAATH,
Director,
Department of Research and Specialist Services.

Annual Report of the Director of Conservation and Extension

for the year ending 30th September, 1973

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ORGANIZATION AND STAFF

Organization

Arrangements for reorganizing the Department on the basis of specialization of field staff are nearing conclusion. The new set-up is intended to (*inter alia*) improve job satisfaction.

There can be little doubt that a degree of specialization for field staff would be one of the factors that would bring more job satisfaction and tend to keep men in the Department. Limited specialization has been tried in one or two areas and is popular with staff and farmers alike. Thus it is imperative that recommendations for reorganization be expedited. A virile and effective service is an essential need to Agriculture.

Housing

Funds were provided for the construction of quarters for two European officers at Karoi and Enkeldoorn.

The provision of housing for African staff continues to be a major problem. However, funds for five units were provided during this financial year. At this rate it will take a very long time to arrive at a satisfactory housing position.

Water Supplies

The provision of additional funds for maintenance, tanks and water guttering is also very necessary.

Transport

Present mileage rates are still considered to be inadequate although an extra 0,8 cents per kilometre has been authorized for vehicles operating on dirt roads.

Visits to other countries

These are half the number undertaken last year. However, the Department's needs have been met by the visits listed in Appendix I.

Boards, Committees, Conferences and Meetings

The Department's representation continues to extend over an ever-increasing number of councils and committees; these are more and more characteristic of the operation of the agricultural industry and its ancillaries. Details are shown in Appendix IX.

Staff training

Training in topical agriculture has been maintained in a full programme of courses for staff. This on-going programme ensures technical efficiency of the Department.

A number of senior staff have attended seminars, organized by the Branch of Community Development Training. These seminars are designed to orient all civil servants to Government's policy of community development.

There has also been full participation in the Public Services Board's management training programme which aims to improve administration. Twenty-eight senior staff (Group officer level and above) have attended courses.

THE YEAR, THE LAND, DEVELOPMENT AND PRODUCTION

Weather

The past year was the worst over-all growing season on record and there were disastrous results in many Intensive Conservation Areas. The season started with showers in October and early November; this period was followed by hot, dry conditions for six to eight weeks, with patchy rain following during February and March. However in the southern half of the country there were no early rains and the season only started in late January or early February, but these rains were sufficient to avert what could have been disaster. Runoff was limited over all the country and dams did not fill to any extent. This led to water restriction areas being prescribed and resulted in fewer plantings of winter wheat and other crops. The winter was mild with less frost than is usual.

In some areas September rain greened-up the veld to give limited grazing.

Soil Conservation

All provinces report negligible erosion this year due to low runoff. The summary of mechanical conservation works (Appendix V) shows a decreased request for pegging, and a smaller area of land protected—35 373 hectares as opposed to 44 880 hectares last year. The total length of waterways and roads pegged has also decreased slightly to 340 km of waterways and 310 km of roads. Provinces report that less new land is being opened up and land is being consolidated into larger units.

There is concern over the relaxation in conservation efforts by farmers and fear that heavy storms this coming rainy season will cause damage. Works are not always built to the required minimum standards.

Increasing interest is being shown in integrated layouts which make working the land easier but involve time-consuming planning and implementation.

Bush encroachment

Bush encroachment is attracting attention, particularly in Matabeleland where approximately 1 500 hectares of bush were cleared during the year. A new research programme on bush control was started at Matopos which farmers are watching with interest, but until better methods of control and/or long-term low interest finance becomes available, nothing noteworthy is likely to happen.

Veld fires

Veld fires have been a problem in the latter part of the dry season, with severe fires in understocked areas.

Planted pastures

Increased interest has been shown in irrigated pastures. Dryland pastures on the other hand appear to be losing favour. It can be predicted that both dryland and irrigated pastures are likely

to increase in importance following the recent increase in beef prices.

Veld and pasture management

The season has highlighted the urgent need for further extension effort on veld management. Sound veld management plans and conservative stocking rates have carried many farmers comfortably through a very difficult season. Water shortage rather than lack of grass has been the overriding drought factor. It has become obvious that water supplies are often inadequate even on well planned farms; this aspect of veld management planning requires close attention and the placing of less reliance on natural open water supplies.

Where stocking rates have been high, the veld has been heavily grazed even when a management plan has been in operation. Some farms have had to remove cattle.

Wide variations in rainfall and past management practice has caused grass productivity to vary from nil to 90 per cent. of normal. Generally speaking sandveld areas have again proved their resilience. Red soils however give cause for great concern as large areas are devoid of cover, and the situation is being further aggravated by harvester termites.

There has been a steady and increasing demand for veld management plans in African Purchase Lands. Interest in European areas has declined or remained static.

The total area planned during the year was 733 036 hectares compared with 907 440 hectares the previous year, giving a total planned area of 38,9 per cent.

The number of individual plans has increased significantly—1 049 plans as against 746 last year—largely as a result of increased interest in Purchase Lands.

Recording of veld management remains a major weakness. The main reason for this is not known, but it is assumed that farmers in general are not convinced that the benefits of recording outweigh the work involved.

Water Conservation

Surface water supplies have been extremely poor, due to the drought. Some catchments were declared water shortage areas. Many streams, categorized as perennial, became dry.

Farmers are showing increasing interest in the building of large dams. Conex can offer only a limited service in the supervision of such specialized construction. Consequently, a substantial amount of this kind of dam building is being undertaken by Ministry of Water Development and private contractors.

One of the most significant advances to be reported is the development of pipeline schemes; the number of new schemes reported from the low rainfall areas is almost double that of last year.

The drought is no doubt the stimulus for this valuable investment, as it is in the case of the development of underground water supplies. Here again there has been a substantial increase.

FIELD TRIALS AND DEMONSTRATIONS

A number of cropping trials were carried out during the year. Horticultural trials which were carried out included Armillaria on peaches, cold storage and transport of peaches and nectarines, DNOC on apples, gypsum ammonium nitrate on peaches, nematode control on peaches, seed germination trials with peach and apricot stones, out-of-season onion trials and macadamia nut propagation.

Trials were designed to stimulate interest in various cotton-growing techniques. The trials helped to reinforce experimental data and were carried out in co-operation with research.

Apart from demonstration plots at Gatooma Research Station, other trials were concerned with:

(i) High population late planted cotton trial in the Doma area.
(ii) Growth regulators.
(iii) Late planting population variables.
(iv) Soil insecticides.
(v) Spray application trials for bollworm control.

A trial relating to cattle and the use of free choice minerals was conducted at Annandale farm, Somabula.

Grazing trials were conducted at Lupane and Tuli and concluded at Masera.

Whole farm veld management for African Purchase Lands is the subject of trials at Chesa Chitomborgwizi and Zowa. As a training facility a grazing demonstration has been established at Domboshawa.

Chemical bush control trials are sited at Sessombi. Fertilized pasture trials, established in collaboration with farmers, continue in the Wenimbi, Chipinga and Limpopo ICAs.

Mine dump stabilization

Replicated trials of selected tree, shrub and grass species have been planted on mine dumps at Connemara (Hunter's Road), Cam and Motor (Gatooma), Trojan (Bindura) and Mangula mines.

Notwithstanding the poor rainfall of the past summer, vegetation on dump trials has made considerable growth and certain species of tree, shrub and grass are showing promise. It is interesting to note that growth response of a single species varies on different dumps. This fact supports the background hypothesis to this trial that different plants differ in their response to toxic components, and tolerant plants can be found for most toxic situations.

For practical purposes it would appear that the line of recommendation to be followed is already clear, but an adequate period of further work is necessary to confirm and guarantee these preliminary recommendations.

It is also necessary to determine the mechanism whereby certain plants are able to make successful growth in toxic conditions. This information will provide the key to accurate predictions in selecting suitable plant material for future stabilization

programmes involving any of the large variety of mine dumps in Rhodesia.

Further studies are being conducted into the establishment of vegetation on alluvial chrome tailings at Mtoroshanga.

ENGINEERING

General

Demand for engineering services continues to increase and it is encouraging to note that a commodity association of the RNFU has agreed to finance an additional engineering post to meet the specific needs of their Association. The already heavily committed work programme has been further aggravated by the necessity to release a number of professional and technical officers for military duties which has accounted for an average of 10 per cent. of available time.

Agricultural Engineering Centre

The Machinery Testing and Development, and Tillage sections have now been joined by part of the Conservation Section dealing with designs and investigations. This will enable soil and water conservation trials and demonstration plots to be established, and so provide basic design criteria and facilitate training of conservation staff.

Basic workshop facilities provided by SCAM are now proving invaluable for development of experimental and training equipment. However, in the absence of a workshop technician, maximum utilization cannot be made of equipment which would benefit not only Engineering Branch, but all sections of the Ministry concerned with experimental equipment.

Demand for machinery testing and development projects far exceeds staff capacity and despite the pending appointment of an additional post provided by a commodity association of RNFU this section will still be unable to meet all demands.

Projects during the year included grain drying, grain augers, EDB applicators, heat exchangers, reversible disc ploughs, mechanical pickers for pyrethrum flowers, use of solar heat for crop drying and the effect of synthetic grain bags on storage drying rate of maize. Much of this work is in conjunction with SCAM and local manufacturers. The biggest single current project is the testing and development of tractor-drawn reversible disc ploughs which have been entered for the competition sponsored by the Ploughing Association of Rhodesia, NRB, SCAM and Conex.

Various reduced tillage and moisture conservation trials, started over the last few years, have shown the importance of moisture conservation as a major economic factor in crop production. Despite the establishment of basic criteria for many conditions, the bulk of the work still remaining to be done is the adaptation of techniques and equipment to suit specific conditions, particularly on irrigation schemes.

Soil and water conservation engineering

The Conservation Engineer dealing with investigations and designs has now been based at the Agricultural Engineering Centre. This is in order to establish critical and non-critical soil and water conservation trials to provide urgently needed basic criteria for the development of efficient conservation methods for farm use.

The first farmer bulletin dealing with conservation practices specifically for tobacco growers has been published. It is proposed to produce a similar publication specifically for cotton growers.

Extension

Mechanization

The Mechanization Section Programme was disrupted this year because of the urgent need to carry out field investigations on behalf of a commodity association of the RNFU. During this four-month period it was only possible to undertake a very limited extension programme. Requests for advice were mainly related to various aspects of tillage, particularly the selection of machinery to fit into improved reduced-tillage and moisture-conservation techniques.

Farm buildings

It was expected that capital development would be reduced as a result of the drought, but on the contrary, an increased interest has been shown, particularly in labour housing.

Conservation

The Conservation Section is beginning to make a substantial impact on the conservation extension programme, mainly in staff training and/or the publication of texts for training and extension purposes. When funds are available it is planned to concentrate greater efforts on practical soil and water conservation training, not only for Conex staff but staff of other departments concerned with conservation and, wherever possible, the farming community.

Engineering training

Domboshawa Engineering Training Centre conducted 32 one-week courses attended by 382 trainees. Facilities were also provided for a further 12 courses to accommodate 114 trainees. These courses are divided approximately equally between the farming community, Ministry of Internal Affairs and Conex. However, demand for training of tractor drivers on European farms exceeds capacity of the Centre but there is room for additional courses for farmers and managers.

In addition to the courses at the Centre, three mobile units operating with ox-drawn equipment offered one-day courses attended by 806 farmers.

The Farm Buildings Section gave two courses attended by 20 trainees of Ministry of Internal Affairs.

Conservation Working Account

Responsibility for dam building in Midlands, Matabeleland and Victoria has now been transferred to Ministry of Water Development. Since work other than dam building amounted to only

54 hours during the year, the remaining two Conex units were moved to Mashonaland where demand for our services exceeds capacity. Sixty-six dams were completed in European areas, one in African Purchase Lands and one in Tribal Trust Lands. Total productive hours were over 17 552 compared with 16 000 in 1971–72 and 15 000 in 1970–71.

The trading account closed at the end of the financial year showing an over-all profit of approximately $34 000 compared with $6 000 last year. The difference in profit for the two years is largely accounted for by greater productivity, possible because of lack of rain and withdrawal from Midlands of units which operated at a loss for the past three years.

HUSBANDRY

General

Specialist officers devoted much time to staff training, participation at field days and discussion groups. A large number of technical articles (listed in Appendix II) were written for the agricultural press. Broadcasts were given throughout the season on topical subjects. Demand from farmers for specialist advice on all aspects of production and attendance at field days has further increased.

Agronomy

Interest in wetland use, mentioned in the 1972 report, has increased but the adverse season had a deleterious effect on the growing of maize under these conditions. Nevertheless, wetland maize yielded more than nearby dryland. Difficulties occurred in establishing the crop in vleis and these difficulties are likely to multiply in the coming season. Lodging of short-season maize was again a problem and there was a continued swing to longer-season cultivars.

The development breakthrough in irrigated ground-nuts reported last year manifested itself in an increased number of growers. Lifting and reaping machinery was available on a limited scale and it is expected that more equipment will be available for increased plantings next year.

A similar breakthrough in soya-bean production can be expected now that a higher price has been announced—the result of a shortage of fish meal.

Interest in cotton pest scouting has increased and farmers are placing greater reliance upon trained African scouts.

The Season and Agricultural Production

Cash crops

Tobacco

Flue-cured

Seedbeds were generally uneven and patchy. This was attributed to poor seedbed management but there was no shortage of seedlings, except at Karoi, where repeated replanting taxed supplies.

Most growers were able to plant at the normal time but planting was delayed until January in the Karoi Group owing to a lack of rain. Seedlings stood up to adverse conditions where land preparation was good. Reaping was delayed by two to three weeks and curing was difficult in many cases; much green and black tobacco was produced, particularly from early pickings. The position looked desperate in late December on many farms but January rainfall improved matters considerably. Very good crops of flue-cured tobacco were produced in north-east Mashonaland, but elsewhere crops were variable.

Grading was late, and growers were pleased with prices paid for top quality tobacco, but dissatisfied with the middle grade payments which were only 10c per kilogram more than low grade tobacco prices. However, prices for the middle grades did improve later in the season.

Burley tobacco

The season was very good for burley, accompanied by a 30 per cent. increase in the average floor price. Reasonable conditions occurred in the main growing area of north-east Mashonaland. Good prices were paid for low grade tobacco on auction. There is, however, expected to be some cut-back in burley production in 1973–74.

Cigar filler

Cigar-filler crops were variable, depending upon weather conditions and the grower. Only one company will be growing this crop in the coming year.

Maryland and fire-cured

Maryland has again been disappointing and only a small quantity will be grown in future. Fire-cured tobacco has again been unsuccessful.

Oriental tobacco

Production is being cautiously encouraged in African Purchase Lands.

Cotton

Generally light rainfall caused poor germination and some fields were replanted three times. Cotton, however, stood up well under the circumstances and yields were generally higher than expected. Average temperatures were about 3°C above normal for most of the season and humidity was low. This meant that many lands of irrigated cotton did not receive sufficient water, and stress affected lint maturity. Micronaires were generally lower than normal and led to down-grading due to weakness. Bollworm incidence was less than usual in all areas but weather conditions favoured red spider mites. There were several reports of red leaf disease which did not improve when foliar nutrients were applied. It appears that this disease was solely due to moisture stress.

The Del Cerro crop, grown in the Shamva ICA, showed a tendency to lodge, even when plants were relatively short; yields were, however, very good.

Crops matured with little difficulty, except in certain northern areas.

Labour was short on some farms and growers tended to pick the whole crop in one operation. This resulted in mixing good and poor-quality seed cotton and down-grading of mixed bales.

The lowveld season was ideal; high temperatures and low cloud densities gave above average hours of sunshine. Yields, however, were well below the envisaged potential, probably owing to prolonged periods of high evaporation and overcast weather at crop maturity.

It was noticed that the period from flowering to boll maturity was considerably shorter than normal. The lowveld crop was almost entirely machine-picked and although some growers obtained higher results, yields were approximately 3 000 kg/ha.

Pyrethrum

Pyrethrum is grown in the Marandellas and Inyanga areas. Crops suffered severely from dry conditions but irrigated crops suffered to a lesser extent from high temperatures and lack of humidity.

Food crops

Maize

The season was one of the worst on record. Yields dropped in some areas from 7 000 kg/ha to 1 000 kg/ha, with the result that the national crop was the lowest for many years. The value of minimum tillage was emphasized where farmers using these techniques produced yields well in excess of neighbours who used standard land preparation methods. The season started with poor planting rains and never recovered. Even wetland maize produced poor yields due to dry weather in December, but nevertheless considerably out-yielded nearby dryland maize. Water-planting was disastrous. Although a few very early planted crops achieved more than 2 000 kg/ha, some water-planted crops were not reaped. All irrigated maize yields were poor owing to low humidity and high temperatures at the pollination and grain-filling stages.

Groundnuts

Irrigated groundnuts were grown on a fairly large scale by European farmers. Yields of between five and six tonnes per hectare were obtained. There is considerable interest in expanding this crop in view of the price being paid for the 1973 intake year.

Dryland crops were poor and most ground-nuts grown were produced under irrigation. This crop continues to be popular in African Purchase Lands and, despite low yields this year, areas planted should increase.

Soya-beans

Owing to drought, the crop was planted late and, since it is mainly grown in heavier soils, germination was poor; low yields were consequently obtained and, in some instances, crops did not justify combining. Yields in the region of 1 500 kg/ha were obtained where rain was better.

Wheat

The highveld area planted was greatly reduced by water shortage. It does appear, however, that yields per hectare are better than those of the 1972 winter. Stem rust was reported from one site only and relatively little damage by frost was recorded. Some lowveld crops were affected by leaf rust at a late stage of growth. A certain amount of powdery mildew was observed on the highveld. Lowveld plantings were earlier than in 1972. Aphis was common in the middle and highveld but farmers were quick to spray with systemic insecticides. Quelea were also on the increase in the middleveld. Over-all, the season has been mild, resulting in shorter ears than when conditions were cooler at the time of ear formation. Conditions, however, were favourable and the lack of ear length has been compensated by heavier individual grain mass.

Owing to rains in September, average lowveld yields were in the region of 3 500 kg/ha but yields of up to 5 000 kg/ha obtained elsewhere.

Sorghum

Much of the crop was planted late as a substitute for maize and did reasonably well. It can be said that sorghum proved its value as a grain crop in a year when maize growing conditions were adverse. Yields of up to 4 000 kg/ha from January planted sorghum were common.

Sunflowers

The area planted to sunflowers increased over that of previous years owing to dry conditions. Crops were planted in late December and early January. Reasonable yields were obtained on heavier soils.

Seed beans

Yields in the region of 2 000 to 2 500 kg/ha were obtained in the lowveld.

Rice

Seventy-six hectares were grown in the lowveld. High evaporation conditions resulted in poor yields. The disease *blast* affected the crop severely.

Potatoes

Significantly large areas are planted near Salisbury, Bulawayo, Umtali and Marandellas. Yields of March and June plantings were not affected by *late blight* and were well in excess of the rain-grown crops. Summer crop yields were only 70 per cent. of irrigated crop yields.

Edible beans and peas

Most edible bean crops are grown on European farms for domestic consumption, although fair quantities are produced in African Purchase Lands.

Despite the drought, the pea crop was extremely good. Absence of frosts and a cool long winter contributed to high yields.

Fodder crops

Maize, sorghum and lucerne are the main fodder crops grown, particularly by dairy farmers. Yields of over 18 tonnes per hectare (dry matter) of lucerne are being obtained where management is correct.

Horticultural crops

Tea

Owing to the price paid for green leaf, expansion in out-grower tea production in Chipinga has been minimal. Yields in the Chipinga Purchase Lands were lower than expected. Expansion was curtailed by dry planting conditions. Yields of dryland tea were reduced significantly but irrigated tea yielded well.

Coffee

The area of productive coffee is expected to increase rapidly. Farmers have accepted the need for mulch and have planted out Napier fodder for this purpose.

Non-pruned young coffee trees at Chipinga Research Station gave significantly better returns than pruned trees. However, it is expected that pruning will be required for mature coffee trees. Rust has spread in Chipinga but has not yet reached the Vumba area. A training scheme for boss-boys on reaping has proved successful and resulted in better cherry output and improved quality. The outlook for coffee seems better than a year or two ago; the marketing situation is encouraging and growers are attempting to improve management, soil conservation, pruning, irrigation and disease control.

Nut crops

Although interest has been shown in these crops, most activity is still confined to nursery work and a few large commercial plantings. Main areas of interest for macadamias are Umtali South, Melsetter and Chipinga. Pecans are being planted extensively on the watershed. Sales of both types of nut are not expected to expand before 1975.

Almond trees are growing extremely well in Melsetter and growers in other areas are interested in the possiblities of this crop.

Pome fruit

A marked increase in the yield of apples without an appreciable drop in price led to difficulties in obtaining supplies for canning. Apples from young trees coming into bearing have been readily absorbed by the fresh-fruit trade and since over 40 per cent. are still under four years of age, this will probably create marketing problems later.

Only 5 per cent. of the pear crop was processed, the balance being channelled on to the fresh market. Pollination, harvesting and ripening still present problems and few new orchards are being established. New dwarfing rootstocks have recently been released by South Africa and these may encourage expanded production.

Stone fruit

All peach cultivars exhibited small fruit as a result of dry conditions. Fruit ripened over an abnormally short period, some cultivars as short as 10 days, but scattered ripening in different areas allowed fairly good market supplies. Prices were generally good. New cultivars, Orion, Albatross, Ingwe and Safari have been introduced.

A rather disappointing plum crop resulted from hail damage on the properties of some larger growers. Prices were extremely good and canners had difficulty obtaining supplies.

Considerable plantings of plum cultivars suitable for either the late market or the canning trade have taken place. Since 50 per cent. of the canning cultivars are under 4 years of age canners should receive abundant supplies in the future.

Although the apricot crop was smaller than last year, quality has been exceptionally good. A few small plantings were made.

Grapes

Owing to the drier than normal season experienced, grape quality was excellent. Both table and wine cultivars produced a record crop of highest quality and of good sugar content. Prices remained high until the South African grapes reached the market in early February. Many plantings in Matabeleland are being established mainly for wine.

Some table grape cultivars were of as good quality as imported South African types. Vines have flowered well this year and a heavy crop is expected in the 1973–74 season.

Subtropical fruit

Initial enthusiasm for avocados has declined slightly, although several growers continue to develop new orchards. Despite good crops in the Salisbury area there is still a demand for increased quantities.

The severe frost of August, 1972, had long-term effects on the banana crop and reduced yields considerably in Burma Valley. However, the mild 1973 winter and the collapse of banana crops at Triangle has ensured a good market for smaller growers.

Despite shortage of rains, citrus yielded well in the northern half of the country but yields in the 1974 winter are likely to be poor if the orchards were affected by drought this season. The hanging of fruit for late cropping resulted in severe granulation.

Extremely large pineapples were obtained from the Cayenne cultivar this year and caused difficulties for canners. Sunburn during the exceptionally hot period was also a problem. Further plantings to catch the fresh fruit trade are being

made in the Melsetter, Hartley, Norton, Sinoia and Karoi areas.

A few growers continue to produce mangoes and the largest orchard is currently being top-worked to stringless cultivars. Scope for top quality fruit on the local market is unlimited.

Berry crops

Strawberry production has declined and reduced yields have resulted from the use of virus-infected stock.

Production of gooseberries is below demand because of poor prices. Ratooned crops did well as did late summer plantings which avoided bollworm problems.

Vegetables

Good quality vegetables were supplied to the Salisbury markets, cabbages and tomatoes dominat-Salisbury Market, cabbages and tomatoes dominating. Owing to mild conditions in tomato growing areas, prices remained stable during winter but reached high levels in late September. Seed quality is deteriorating and adversely affecting fruit quality. Low prices for canning tomatoes have not benefited the grower and interest in this line of production is minimal.

Snowcap cauliflower has again proved a very good cultivar, being a top quality, high yielder. An attempt to increase production of rape and kale to catch the African market was seriously affected by dry conditions.

Cucumber and gem squash prices fell as a result of the late winter; hybrid cucumbers proved outstanding in respect of yield and disease resistance.

High prices for onions during winter led to increased interest. Trial plantings of sets for autumn cropping have proved most remunerative and increased production from this method can be expected.

Mushrooms

Owing to the over-supply and unsatisfactory marketing of the crop, half the growers have ceased production. Supplies, however, are still good and prices are consequently higher.

Bees

The Bee Protection Act is reaching its final stages, prior to being read as a Bill in Parliament.

Construction of the bee mating tower and research beehouse at Henderson was completed and controlled mating trials are about to be undertaken.

The number of bee-keepers has increased rapidly owing to exceptionally high prices and large demands for honey. Firms are offering good prices for first class honey from African bee-keepers. The whole of the year's production was consumed locally.

Manufacturers have started producing frame hives and these have met with the requirements of the Central African Standards Association. Two wax foundation mills produced enough sheet to satisfy local demand.

Bee-keeping courses were held for beginners and African bee-keepers. Large numbers of visitors from Rhodesia, and from seven other countries in Africa, Europe and America, were entertained at the bee-house at Henderson.

The dormant Association of Midlands Bee-keepers has been revived and the associations in Manicaland, Matabeleland and Mashonaland have all increased membership numbers. Excellent exhibits of aparian products were judged at Salisbury and Manicaland shows but entries at Bulawayo were severely reduced by drought.

Livestock

Beef cattle

General

Buoyant economic conditions in the beef industry were severely offset by the drought. The poor season was the dominant factor in certain areas such as Victoria Central; early season predictions of a disastrous winter were however, not borne out in all areas. Late rains, together with the CSC residual buying scheme for young stock, eased the position for many farmers. Indeed, for the early part of winter in particular, many areas report cattle in particularly good condition for time of year. This situation has been aided by greatly increased supplementary feeding resulting from availability of drought relief funds, absence of excess rank grass and to timely destocking by efficient farmers. Water shortages have restricted use of available grass in some areas. The last months of the dry season will nevertheless be very difficult for many beef producers as the available grass and water is used up.

Supplementary feeding

Extension has continued to place emphasis on supplementary feeding and an upward trend in this vital practice was stimulated by drought relief funds.

In severely affected areas supplementary feeding commenced during late summer or in early autumn. Considerable difficulties were experienced however, owing to shortages of key food ingredients and consequent changes in feed composition, and to increased feed prices. An increasing interest in home-produced licks is reported.

Fattening

In recent years concentrated extension to promote fattening on grass gave impetus to this practice. In some areas this impetus has slackened; high prices demanded for cattle have deterred farmers from "buying-in".

The expected large increase in pen fattening was delayed by the effects of drought. A reasonable season will see a very considerable increase in pen fattening.

Both within the veld system and within the pen system of fattening, age of slaughter continues to decline. Research results from Henderson showed the practicability of fattening very young cattle and increasing numbers of farmers are adopting the practice. Too many very light-mass carcasses below the optimum 200–250 kg are being produced. This problem can be rectified by good management.

Management

Conception rates for the calf crop now falling are reported to be surprisingly good in view of conditions prevailing during the bulling season. Predictions for the coming bulling season are less optimistic. Apart from effects of drought, the relatively low national weaning rate of 50 to 60 per cent. remains the weakest aspect of the country's beef production industry.

It is encouraging to report wider use of pregnancy diagnosis as a management tool.

Adequate recording and analysis leading to good management is a vital process in economic production. Several recorded herds demonstrated gross margins which were more than double the average in their areas.

Breeding

Considerable extension emphasis was placed on choice of optimal production systems in Mashonaland where the choice of systems on mixed farms is often complicated.

The majority of producers in the extensive areas of the country are now vertically integrated from breeding through to selling slaughter cattle. This is a stable form of production for these areas. It may lead however, to a shortage of young stock for pen fattening in crop-growing areas.

Cross-breeding is receiving increased attention. If correctly applied this can increase output significantly. There is however, insufficient attention to implementation of systematic cross-breeding plans and, particularly, to performance recording in these herds.

Bull prices have increased sharply in recent months, reflecting strong interest in beef breeding.

Purchase Lands

Slow but definite progress in cattle management is reported. There have been significant increases in cattle sales reflecting, in part, implementation of good veld management.

Beef Performance Testing Scheme

Despite the closing of the scheme to new members during 1971–72 the number of animals born in the 1971–72 season analysed was 20 500, an increase of 2 600 over the previous year.

Since the scheme was opened to new members in September, 1973, 14 farmers have applied to join.

After some years of assistance from the Biometrics Branch of Research and Specialist Services responsibility for weaner data analysis was assumed directly by this department. The concurrent transfer of computer operations to the ICL Computer Bureau resulted in far more machine time being available. This in turn has resulted in a considerably decreased delay in returning processed results; this is now about two months which is far more acceptable.

In the nine and a half months since this new procedure was introduced 24 921 calf records have been analysed. Of these, 10 400 were 1972 calves; this compares with the 1971 figure of only 6 000 calves analysed up to the same time the previous year.

Dairy production

This has been a difficult year for dairy farmers. Forage reserves are very low and have had to be augmented with purchased feed provided under drought relief. In parts of Mashonaland adequate silage has been made by utilizing failed or partly failed grain crops, but extra costs have been incurred in the provision of more expensive concentrate feeds. In drier parts of the country, the drought has underlined the importance of irrigation in providing a reliable source of forage so necessary for stable dairy production.

Generally, milk production has increased—often as a result of better feeding supplied in the absence or shortage of natural forage supplies—but the difference in efficiency between upper and lower echelons of dairy farmers yet again accentuates the need for a dairy extension specialist within the Department.

Sheep

The year has been a good one, except in one or two instances where supplies of roughage failed completely. Latest statistical returns reveal a further decline in national flock numbers. Interest is now increasing amongst farmers as a result of ever-rising producer prices for mutton and lamb. The gap between demand and production still appears to be widening and sheep provide one of the few really profitable farming enterprises offering scope for considerable expansion in the short term and prospects of a stable internal market in the long term. With sheep now a profitable enterprise for the efficient producer who gives considerable personal attention to detail, it is likely that a significant increase in production should come about during the next two or three years.

The local wool market has once again had its problems, mainly owing to the closing and subsequent re-opening of the major consumer—the Zuwa Weaving Centre at Inyanga—but also as a result of soaring wool prices on the world market. These high wool prices have even further enhanced profitability of dual-purpose sheep.

The Sheep Handbook is now completed.

Pigs

Pig production remains a profitable enterprise, but the 20 per cent. cut in marketing quotas could have a serious effect on smaller producers, particularly those who rely on pigs to make marginally economic properties viable.

Livestock Improvement Committee

Cattle imports were lower than for the preceding year. This can be attributed to drought conditions prevailing during the first half of 1973 and in part to availability of better bulls on the local market.

There has been a welcome, though moderate, increase of interest in sheep production with a corresponding upswing in imports.

Exports of registered cattle have soared over last year's figures, Aberdeen-Angus, Brahman, Hereford and Sussex proving the most popular breeds.

Prices for bulls on the local market are markedly higher. Demand is good for beef breeds.

IRRIGATION

Trends

Despite general interest aroused by modern semi-automatic irrigation systems such as the Israeli drip or trickle, drag lines, micro jet or large composite revolving boom sprays, very few of these recent innovations have been installed by farmers. Such installations have been restricted mainly to peri-urban plotholders and small areas of intensive vegetable or fruit production. The majority of farmers prefer conventional sprinkler systems requiring early morning and late afternoon lateral moves with alternate riser moves at midday and midnight. Considering present low labour costs this is a wise choice.

Most rivers are now reaching the stage at which normal flow is fully righted, and consequently current development has to be based on supplies from weirs, dams and boreholes.

Considerable development is taking place on underground aquifers, especially those west of the Great Dyke, and stretching from Karoi in the north to as far south as Gwelo. Yield from boreholes in these aquifers is high. Unfortunately the waters are rich in bi-carbonates, and unless used according to suitably planned scheduling, can lead to an over-accumulation of lime in soils, resulting in an unduly high pH value and reduced crop yield. This is being watched closely by this Department in association with Research and Specialist Services. Rapid development of the Nyamandhlovu aquifer is taking place and this has drawn attention to the urgent need for suitable legislation to restrict development of such aquifers to within the safe limit of continued supply.

Advisory work

The drought has created an even stronger demand for irrigation, and specialists and field staff have found it increasingly difficult to meet requests for advisory visits on both existing and projected schemes.

There has been emphasis on larger schemes, based on storage works and pumping schemes to be shared jointly between groups of farmers. Several large schemes, to be operated as combined schemes under the Water Act, are being put forward by Cotton Growers' Buying Co-op and the Department is taking an active part in investigation and evaluation of these.

New water pollution legislation has necessitated the disposal of treated sewage effluent through irrigation. The result is that specialist and field staff have been actively concerned in advisory and design work with the following municipalities and councils: Salisbury, Gwelo, Marandellas, Sinoia, Fort Victoria, Gatooma and Norton.

Six water shortage areas were declared as a result of the drought and the Department played a prominent part in assisting the Water Court in arriving at satisfactory distribution solutions.

A survey was carried out at the request of the Lowveld Cane Growers' Association into drainage and associated salinity problems. The survey is complete to the stage at present deemed necessary and has highlighted main problems: unlined canals, seepage from night-storage dams and poor water management. The survey has created awareness of these problems. Several farmers have commenced canal lining operations and are seeking advice on water management. Some 60 observation wells have been installed on one particular farm in order to study the draw-down pattern of tile drains on basalt soils, and to study the fluctuations of the water table on some undrained lands. The use of PVC piping for these observation wells has proved to be both inexpensive and easy to install. It is hoped that most cane farmers will eventually install such wells and monitor water levels in their lands.

This should enable growers to be forewarned of trouble spots and enable them to take necessary preventive action.

Irrigation training

Four irrigation courses were held. Two of these were general courses of 10 days' duration, for Conex staff and Internal Affairs staff respectively. The other two were for a shorter period, designed especially to meet the needs of APLs in one case, and to serve as a refresher course for experienced Conex officers in the other.

Towards the end of the year a special course for commercial designers commenced. The course, which is focused on a background knowledge of soil-water-plant relationships leading to efficient sprinkler design, is open to design staff of commercial irrigation firms and is being conducted on a one full day per month basis for a period of three to four months. The current course is proving to be successful and is over-subscribed. There can be no doubt of the benefit of such courses to the agricultural industry as a whole.

Investigation and Development

Investigation and testing work at Hatcliffe has entered its third year. Keen interest is being shown in the results by leading commercial irrigation designers. Unfortunately the testing programme had to be slowed down, owing to a backlog in the processing of data which is very time consuming.

The type of information being obtained, especially that of comparisons of efficiency of distribution

between different combinations of nozzle size, spacing and operating pressure, is not obtainable from textbooks, nor is it at present being as closely looked into elsewhere in Africa.

Distribution at low precipitation rates, using various combinations of sprinklers and spacings, was investigated along with other problems. Initial results are encouraging, suggesting that rates as low as 5 mm/h are quite practicable. Further investigation is required but as a result of initial work it now appears possible to satisfy the farmer preference for long sets with low precipitation rates, a combination which lends itself to ease of management.

There has been no development of Government-sponsored irrigation schemes, but investigations are in hand by Ministry of Agriculture, Irrigation Development Committee on the Lesapi Dam Scheme, Odzi Osborne and several other schemes.

TRAINING

General

Thirteen courses were held for Conex staff on subjects ranging from conservation to agro-meteorology. Ten ordinary courses were held for Ministry of Internal Affairs agricultural staff who hold one-year agricultural diplomas. The object of these special courses was salary advancement. The programme of public speaking courses for Research and Specialist Services has been completed for existing staff, and any further courses will be to cater for new entrants.

Objective testing has resulted in a measurable improvement in the general standard of courses with most trainers understanding the system and applying it to advantage.

The number of trainee/training days this year shows a decline in actual training days, but a small increase in the percentage of time spent by Conex staff on courses. Thus, the decline from 959 to 884 trainee/training days was in fact an increase of 2,0 per cent. to 2,1 per cent. of time spent on training, and is clearly a reflection of reduced staff numbers.

Training Branch facilities have been fully utilized and for the first time it has been necessary to run parallel courses on several occasions.

Domboshawa Training Centre

The number of courses run at Domboshawa this year dropped slightly from 42 to 40 but trainee/training days increased from 4 383 to 4 415. Much of the backlog of African staff training has been eliminated and this is reflected in the reduced number of Conex participants from 424 to 293. This reduced Conex training load has facilitated the provision of more veterinary courses for Purchase Land farmers.

Mobile Training Unit

Effectiveness of the Mobile Training Unit increases on return visits to the same area.

EXTENSION RESEARCH

This section was involved much more with training than in the past. It has also concentrated on surveys which give rise to immediate practical recommendations, and to evaluation of all objective tests and subjective evaluations of courses.

Research projects

(*a*) Specialization survey:

A full-scale survey of farmers and attitudes to specialization in the Range Group. A report has been circulated.

(*b*) Effectiveness of the Mushandike course:

In consultation with the Youth Extension Section, the Research Section drew up objective tests and analysed over 400 pre- and post-test results.

Consultations

Investigation of leadership and social patterns in Chesa and Karuyana purchase lands.

Objective tests were drafted for specialists in various provinces. These same specialists have also been trained so that they can draft and analyse their own tests.

PUBLICATIONS

The Publications Section continues to be highly productive even though understaffed.

The RBC programme *Nhau Dzevarimi* continues its popularity and two Assistant Publications Officers are kept busy not only in the preparation of the programme, but with visits to Purchase Lands. The Sindebele programme *Izindaba Zabalimi* is scripted at Head Office but is still presented by an RBC announcer in Bulawayo.

Papers and publications

The *Sheep Handbook* has now been completed and is in printing.

Two sections of the *Oilseeds Handbook* have been completed, ground-nuts and soya-beans. Early publication is expected.

Other publications were *Tobacco in Rhodesia*, a booklet for school-children. Two editions of *Hortus* were published, in addition to a supplement comprised of papers presented at the *Macadamia and Pecan Nut Symposium*. Six editions of *Kunzwa*, the newspaper for African farmers were published, plus three editions outstanding from the previous year.

Sixteen *Advisory Notes* were prepared and distributed to staff as were two items of *Interesting Information*. One hundred and forty-one articles were edited by the Publications Section and either submitted to publishers or processed as departmental publications.

A large quantity of printed material was distributed to Conex staff and to staff of the Ministry of Internal Affairs.

A considerable amount of time was spent on the preparation of scripts and the editing of a series of

three short films produced by Ministry of Information on the subject of water and the drought. The films were shown on RTV. Two other films produced by the Ministry of Information for the Ministry of Agriculture, *Golden Dawn* and *The Champions* also called for considerable work from Training Branch generally and Publications Section in particular.

A total of 588 farming reminders were prepared.

YOUTH EXTENSION

Conservation eduction

Conservation education continues to be the major activity of the Youth Section which continued, as in the past, to develop the annual NRB theme; this year the theme was *pollution*. Lectures, exhibitions and field trips were organized with the objective of creating an awareness of the threat posed by pollution. A special effort was made to reach as many senior schools as possible and meaningful contact has been made with teacher-training establishments throughout the country.

Youth Extension officers continued to assist in the promotion and development of the Mushandike schools ecology course and a similar type course at Tsanga Lodge, a centre owned and developed by the Rhodesian Association of *Youth for Conservation* clubs.

The Youth Extension Specialist conducted six courses at Tsanga Lodge during the year.

Four conservation teaching leaflets were produced.

1. What is soil erosion?
2. Raindrops cause erosion.
3. Soil cover prevents soil loss.
4. How to heal a donga.

Originally intended for use in the African primary schools, the leaflets have been found useful in European primary schools, and also in secondary schools where they are being used for the RCE Geography syllabus and even in the "O" Level course. Over 5 000 sets of these leaflets have been issued and a further 5 000 are on order.

Twelve trips to Domboshawa for both primary and secondary schools were arranged.

PLANNING

Regional plans

A regional survey of Que Que group of ICAs is being prepared. A draft report has been finalized for the Battlefields ICA and work is nearing completion in Sessombi and Umniati/Sebakwe ICAs.

A very detailed survey of the Deka Catchment in Wankie National Park for the Department of National Parks and Wild Life is nearing completion.

As a follow-up to the Marandellas survey, which was revised and published last year, a beef production planning guide has been produced.

Farm plans

Demand for land-use plans remains at a relatively low level. Thirty-five farm plans were completed. A few were revised and a number of applications for plans are in hand. Greater emphasis has been placed on veld management planning, though even here demand appears to have dropped.

Soil irrigability surveys

Soil irrigability surveys were conducted in the area below the Lesapi Dam, at Romsley Estate in Tsungwesi ICA, and on Ingwe and Parkridge farms for the Salisbury Municipality sewage works.

Settlement surveys

A detailed survey of the Mutema TTL was prepared for Ministry of Internal Affairs. This survey covered 53 600 hectares; in addition a settlement survey was carried out in Stapleford Forest, again for the Ministry of Internal Affairs.

Initial development plans

Initial development planning is being carried out in many African Purchase Lands. These plans will be used for infrastructural development, veld management and individual farm plans.

FARM MANAGEMENT AND WORK STUDY

A scheme designed to assist farmers maintain adequate records for budgeting and cost-flow planning is being developed. There is considerable interest amongst farmers. The number of farmers who will be assisted during the coming season has been increased from 10 to 40. It is hoped that there will be a feed-back of data to the Farm Management Section to supplement cost data obtained from the Farm Management Recording Scheme of the Economics and Markets Branch.

Analysis of farm management records from Purchase Land farmers has continued. Records of 130 farmers have been analysed. With the appointment of a permanent processor it is expected that work in this sector will be speeded up and extended.

A booklet was produced tabulating distributions of farm yields for European farming areas for the 1971–72 season. This is a supplement to the booklet produced in 1972 entitled *Area and Farm Crop Yields*. Work on the determination of crop risk and probable area yields for Mashonaland North and South is now complete. A programme has been devised to determine optimum economic strategies of maize production in specific areas.

Work study investigations have included:

Handling methods and labour output for coffee production;

Tobacco shed layouts; and

Methods of picking and drying pyrethrum.

The Labour Committee of the RNFU was assisted in the evaluation of different aspects of farm work.

CONCLUSION

It is probably a year better forgotten, for while the whole country suffered the consequences of the drought, the Department had particular responsibility for administration and servicing of a relief scheme.

However, in the adversity of the season, many farmers rediscovered farming fundamentals, and a commendable development of systems in harmony with the environment emerged.

In the cropping areas there has been the realization that arable farming must depend upon moisture and its retention in the soil. In the absence of adequate moisture, many expensive and sophisticated innovations, recommended for high production, came to nought.

An increasing number of dairy farmers installed irrigation to eliminate stockfeed crises which frequently play havoc with production. This development is doing much to stabilize dairy farming.

There has been a steady increase in fencing and watering facilities of the ranching areas. Elsewhere, beef farmers are evincing interest in fertilized and irrigated pastures.

While the beef industry undoubtedly seems to be set on a course to prosperity, over-all progress is disappointing when such basic indications as the low weaning rate, are considered.

A long overdue research survey into the reasons for non-adoption of recommended practices, has now been launched.

General farming standards in the African Purchase Lands are greatly improved. African farmers are enthusiastically subscribing to programme plans and team and group work is bringing results.

I wish to thank the many organizations and bodies of the agricultural industry for their co-operation and help; the Natural Resources Board and the Ministry of Agriculture and its various departments for their collaboration and support. Particularly, I thank all Conex staff for dedication to duty during an especially difficult year and for their loyalty to the Department, which is sincerely appreciated.

J. H. H. LOUWRENS,
Director of Conservation and Extension

Visits to other countries

Name	*Purpose*	*Place*
Bembridge, T. J.	Extension research	R.S.A.
Buchanan, G. F.	Deciduous and subtropical fruit	England and Israel
Buchanan, G. F.	Course on vegetable exports	R.S.A.
Burgess, M. W.	Cotton production	U.S.A.
Davey, C.	Drainage study	U.K.
Gammon, D. M.	M.Sc. requirements	University of O.F.S.
Ivy, P.	SARCCUS	Malawi
Meikle, G. J.	Tillage and irrigation	R.S.A.
Papadopoulo, P. (Miss)	Annual Symposium of South African Bee-keepers	R.S.A.
Robertshaw, J. E.	Journalism	R.S.A.
Robertson, W. R.	Agricultural economics	R.S.A.
Stubbs, A. T.	III World Conference on animal production and study tours	Australia and Europe
Tornböhm, R.	SARCCUS	Malawi

Publications

Author	*Title*	*Publication*
Archibald, R. I. M.	Seed beans in the lowveld	Agronomy Handbook
Archibald, R. I. M.	Irrigated wheat in the lowveld	Agronomy Handbook
		Modern Farming
Archibald, R. I. M.	A brief look at cotton in Israel	*Cotton Boll*
Archibald, R. I. M.	Cotton trials at Chiredzi	*Cotton Boll*
Archibald, R. I. M.	Problems of machine-picked cotton	*Cotton Boll*
Barclay-Smith, R. W.	Points for tobacco productivity	*Rhodesian Farmer*
Barclay-Smith, R. W.	Four pillars of Rhodesian tobacco—Part III	*Tobacco Forum of Rhodesia*
Barclay-Smith, R. W. and Elwell, H. A.	Soil conservation for tobacco growers	Departmental
Batty, M. R.	Asparagus, carrot, celery, sweet potato, tomato (6 articles)	Horticultural Handbook
Batty, M. R.	Grape bulletin	Horticultural Handbook
Batty, M. R.	Pests, poisons and pollution: A guide for the home gardener	*Modern Farming*
Berridge, F.	Some thoughts on water conservation	*Rhodesian Tobacco Journal*
Brown, J. C.	Maize harvesting losses	*Rhodesian Farmer*
Brown, J. C.	Hints to farmers (Maize)	*Rhodesian Farmer*
Brown, J. C.	Hints to farmers (Sorghum)	*Rhodesian Farmer*
Brown, J. C.	Notes on wheat bulletin	*Rhodesian Farmer*
Brown, J. C.	Stalk borer	*Rhodesia Herald*
Brown, J. C.	Maize streak	*Rhodesia Herald*
Brown, J. C.	Alternative cultivars to SR 52	*Rhodesia Herald*
Brown, J. C.	Maize lodging in the 1972–73 season	Departmental
Brown, J. C.	Experimental maize hybrids for the 1973–74 season	Departmental
Brown, J. C.	Water soaking of maize seed	Departmental
Brown, J. C.	White maize hybrids, 1973–74	Departmental
Buchanan, G. F.	Capsicum, cucurbits, parsnips (3 articles)	Horticultural Handbook
Buchanan, G. F.	Visit to Israel	Hortus
Buchanan, G. F.	Macadamia and pecan nut symposium	Hortus
Burgess, M. W.	Cotton yields too low	*Cotton Boll*
Burgess, M. W.	Impressions of cotton in U.S.A.	*Cotton Boll*
Burgess, M. W.	Narrowing the gap	*Cotton Boll*
Burgess, M. W.	Topical cotton-growing hints	Umfuli Newsletter
Burgess, M. W.	Study tour of U.S.A.	Departmental
Burgess, M. W. and Brettell, J. H.	Preliminary assessment of the effects of some insecticides on predators of cotton pests	*Rhodesia Agricultural Journal*
Carew, G. W.	Drought and maize yields in three Mashonaland ICAs	*Rhodesia Agricultural Journal*
Carew, G. W.	An economic appraisal of various systems of beef production	Departmental
Cocks, D. J.	Preliminary investigations into pyrethrum drying	Hortus
Cocks, D. J.	Effects of artificial drying of pyrethrum	Hortus
Collett, W. E.	Ground-nuts	Oilseeds Handbook
Collett, W. E.	Soya-beans	Oilseeds Handbook
Collett, W. E.	Soya-beans: Cash and other hidden profits	Departmental
Cormack, D. B.	Garlic, leek, onions, peas, turnips (5 articles)	Horticultural Handbook
Cormack, D. B., Buchanan, G. F. and Kay, K. M.	Peach cold-storage tests	Hortus
de Jong, J.	Labour and methods used in maize harvesting	*Rhodesia Agricultural Journal*
de Jong, J.	Work-study aspects of water-planting	*Rhodesia Agricultural Journal*
de Jong, J.	General organization and labour management in cotton harvesting	*Cotton Boll*
de Jong, J.	Coffee harvesting	Coffee Handbook
Donkin, D. J.	A review of sheep research in Rhodesia	*Rhodesia Agricultural Journal*
Donkin, D. J.	Livestock notes (6)	I.C.A. Newsletters
Donkin, D. J.	Sheep	Sheep Handbook
Donkin, D. J.	Drought maintenance of cattle	*Kunzwa/Ukuzwa*
du Toit, F. P.	Bulk grain handling and storage	*Rhodesia Agricultural Journal*
du Toit, F. P.	Timber as a tobacco-curing fuel	*Rhodesia Agricultural Journal*
du Toit, F. P.	Cattle feed-pens	*Rhodesia Agricultural Journal*
du Toit, F. P.	Labour compound designs	*Modern Farming*
du Toit, F. P.	Fuel and air heat exchangers	*Rhodesian Farmer*
du Toit, F. P.	The farm village	*Rhodesian Farmer*
Elwell, H. A.	Advances in predicting runoff yields and soil movement from small catchments	*Rhodesian Engineer*
Elwell, H. A.	Design of contour layouts	*Rhodesia Agricultural Journal*
Elwell, H. A.	Contour farming provides drought protection and soil conservation	*Rhodesia Tobacco Journal*
Elwell, H. A.	Conservation systems for tobacco production	Departmental
Elwell, H. A.	Causes and treatment of earth-dam failures	Departmental
Elwell, H. A.	Designs and Investigation Section: Programme and progress	Departmental
Elwell, H. A.	Flexible gully-control structures	Departmental
Elwell, H. A. and Barclay-Smith, R. W.	Taboos in tobacco growing	*Rhodesian Tobacco Journal*
Elwell, H. A. and Barclay-Smith, R. W.	Land protection systems for sustained tobacco production	*Rhodesian Tobacco Journal*
Elwell, H. A. and Barclay-Smith, R. W.	Protect the future of tobacco	*Rhodesian Tobacco Journal*

Author	*Title*	*Publication*
Elwell, H. A. and Barclay-Smith, R. W.	Soil conservation for tobacco growers	Departmental
Elwell, H. A. and Stocking, M. A.	Rainfall parameters and a cover model to predict runoff and soil losses from sandveld grazing trials in Rhodesia	*Rhodesian Engineer*
Elwell, H. A. and Stocking, M. A.	Rainfall parameters to predict surface runoff and soil-loss yields from selected field plot studies	*Rhodesian Journal of Agricultural Research*
Elwell, H. A. and Stocking, M. A.	Geography of soil erosion hazard in Rhodesia	*Rhodesia Agricultural Journal*
Gammon, D. M.	On-animal performance recording	*Modern Farming*
Going, W. D.	Cabbage, cauliflower, rhubarb (3 articles)	Horticultural Handbook
Going, W. D.	Papain production	Hortus
Going, W. D.	Gardening notes (12)	The Record
Goldhawk, K. P. and Venter, F.	Is maize drying beneficial?	*Stock and Crops*
Hayward, J. W.	Communication and the adoption process	*Modern Farming*
Hayward, J. W.	Sorghum recommendations (Drought warnings)	Departmental
Hill, J. R. C.	The Rhodesian approach to revegetating mine dumps	*South African Journal of Mining and Metallurgy*
Howden, R. H. G.	Potatoes	*Rhodesia Agricultural Journal*
Howden, R. H. G.	Recommended cultivar list of the more important crops in Rhodesia: 1973–74	*Rhodesia Agricultural Journal* and *Modern Farming*
Howden, R. H. G.	Groundwork for ground-nuts	*Modern Farming*
Howden, R. H. G.	Potato production pointers	*Modern Farming*
Howden, R. H. G.	Hints to farmers	*Rhodesian Farmer*
Howden, R. H. G.	Oilseeds	*Farmers' Co-op News*
Howden, R. H. G.	Potato questionnaire—various interesting points	*Farmers' Co-op News*
Jones, M. E.	Harvesting and handling maize	*Rhodesia Agricultural Journal*
Jones, M. E.	How did it happen?	*Rhodesian Farmer*
Jones, M. E.	Relationship between tractor power and drawbar pull	*Ploughing Association Handbook*
Jones, M. E.	Evaluation of groundnut harvesting machinery	Departmental
Jones, M. E.	Tillage techniques	Departmental
Kay, K. M.	Beetroot, brinjals, green beans, lettuce (4 articles)	Horticultural Handbook
Kay, K. M.	Cooling and cold storage of peaches and nectarines	Hortus
Kay, K. M.	Macadamias can be grown from cuttings	Chipinga I.C.A. Newsletter
Kay, K. M.	New pecan cuttings for high-density plantings	Chipinga I.C.A. Newsletter
Kay, K. M.	Pruning stone-fruit trees	*Makoni Clarion*
Kennan, P. B.	Changes in farm viability in the Mazoe Group of I.C.A.s	*Modern Farming*
Kille, T.	Burley planning for the coming season	*Tobacco Today*
Kille, T.	Flue-cured tobacco 1973–74	*Tobacco Today*
Kille, T.	The tobacco growing season in retrospect	*Agriculture Today*
Kille, T.	Grading and presentation of tobacco	*Agriculture Today*
Kille, T.	Make full use of your quota	*Modern Farming*
Kille, T.	White mould	*Modern Farming*
Kille, T.	Burley planning	*Rhodesian Farmer*
Kille, T.	Do's and dont's of tobacco	*Rhodesian Tobacco Journal*
Kille, T.	Do's and dont's for drought conditions	Departmental
Kille, T.	Study tour report	Departmental
Locke, R. F.	Scout efficiently and save money	*Rhodesian Farmer*
Locke, R. F.	Poor scouting and insurance spraying lead to excessive use of insecticides	*Cotton Boll*
Locke, R. F.	Growing Del Cerro	*Cotton Boll*
McClymont, D.	How can I improve my grading shed?	*Tobacco Today*
McClymont, D.	What successful farmers do to obtain higher yields	*Tobacco Forum of Rhodesia*
McClymont, D.	How do you rate?	*Rhodesian Tobacco Journal*
McClymont, D.	The little things that mean a lot	*Rhodesian Tobacco Journal*
McClymont, D.	January check-list	*Rhodesian Tobacco Journal*
McClymont, D.	Curing Quiz	*Rhodesian Tobacco Journal*
McClymont, D.	Key to common Rhodesian seedbed diseases	*Rhodesian Farmer*
McClymont, D. and Young, J.	Key to common field diseases and pests and problems of Rhodesian flue-cured tobacco	*Tobacco Today*
Meikle, G. J.	Tillage—with emphasis on minimum tillage	*Rhodesia Agricultural Journal*
Meikle, G. J.	Mechanical weed control	*Rhodesia Agricultural Journal*
Meikle, G. J.	Tillage methods suitable for double cropping	*Agriculture Today*
Meikle, G. J.	Tillage—three farmers report	The Badza
Meikle, G. J.	Tillage—where is it now?	The Badza
Meikle, G. J.	New ox-drawn equipment	Departmental
Morgan, A. G.	Bush clearing, grazing systems and stocking rate: The results of trials at Tuli	*Modern Farming*
Naude, J. F.	Commercial livestock feeds	Departmental
Naude, J. F. *et alia*	Planning guide for beef production in the Marandellas Group of I.C.A.s	Departmental
Oliver, G.	A description and discussion of various methods of ploughing contoured lands in Rhodesia	*Modern Farming*
Oliver, G.	A complete preventive maintenance system	*Rhodesian Farmer*
Oliver, G.	Maintenance of air cleaners	*Rhodesian Farmer*
Oliver, G.	Reversible plough manufacturers' competition,	*Barlow's Circle "B"*
Papadopoulo, P. (Miss)	Rhodesian bee-keeping	*Rhodesia Agricultural Journal*
Papadopoulo, P. (Miss)	Anastomo Greek basket hive (revised)	Departmental
Papadopoulo, P. (Miss)	Apiculture bulletin No. 8	Departmental

Author	*Title*	*Publication*
Papadopoulo, P. (Miss)	Bee-houses (revised, metricated and amended)	Departmental
Papadopoulo, P. (Miss)	Bee-houses (Rondavel–Mukoko) as above	Departmental
Papadopoulo, P. (Miss)	Bees (revised and amended)	Departmental
Papadopoulo, P. (Miss)	Beeswax (revised)	Departmental
Papadopoulo, P. (Miss)	Cultivated trees, crops, flowers, etc. (revised, amended and enlarged)	Departmental
Papadopoulo, P. (Miss)	Guide to bee-keeping terms (revised and amended)	Departmental
Papadopoulo, P. (Miss)	Pure honey (revised)	Departmental
Papadopoulo, P. (Miss)	Wintering	Departmental
Papadopoulo, P. (Miss)	Report on agricultural shows 1972	*The Bee Line*
Papadopoulo, P. (Miss)	Let the bees graze	*The Bee Line*
Phimister, J.	Citrus replant problems	Hortus
Pilditch, A. G.	Sprinkler irrigation	Irrigation Handbook
Ramsay, M.	Tobacco in Rhodesia	Departmental
Reddish, S. B.	What price fertilizer	*Rhodesian Farmer*
Reddish, S. B.	Money down the drain	*Stock and Crops*
Robertson, W. R.	Economics of maize production in Rhodesia	*Rhodesia Agricultural Journal*
Robertson, W. R.	Economic aspects of tobacco production	*Modern Farming*
Robertson, W. R.	Suggested method of assessing the economic limit of expenditure on bush clearing	*Modern Farming*
Robertson, W. R.	Economic aspects of irrigation	*Modern Farming*
Robertson, W. R.	Farm viability in Rhodesia	*Rhodesian Farmer*
Robinson, J. C.	Survey—Mutema T.T.L.	Departmental
Robinson, J. C. and Hill, J. R. C.	Deka River catchment survey, Wankie National Park	Departmental
Roblin, A. J.	Buying a bull	*Modern Farming*
Roblin, A. J.	Ensile your grain losses	*Rhodesian Farmer*
Roblin, A. J.	Improved standards for cattle judging	*Rhodesia Hereld*
Sclanders, D. A. C.	Who, where and what	Departmental
Shade, A. C.	Irrigated lucerne on the highveld	*Modern Farming*
Spear, A. J.	Labour and mechanization seminar	*Modern Farming*
Stubbs, A. T. and Donkin, D. J.	Drought feeding of beef cattle	*Rhodesian Farmer*
Thomas, D. R. C.	Soya-beans (for African staff)	Departmental
Various African staff	Sweet potatoes	Departmental
Walker, M. J.	Maize drying experiments conducted by the Department	*Rhodesia Agricultural Journal*
Walker, M. J.	Methods of grain drying	*Rhodesia Agricultural Journal*
Walker, M. J.	Screw conveyors: A brief look at selection and use	*Rhodesian Farmer*
Watermeyer, J. M.	Evaporation pans: their value to farmers	*Modern Farming*
Watermeyer, J. M.	Pre-irrigation saves water	*Modern Farming*
Welland, P. M.	An estimation of the economic aspects of delayed harvesting	*Rhodesia Agricultural Journal*
White-Spunner, D.	How to heal a donga	Departmental
White-Spunner, D.	Soil cover prevents soil loss	Departmental
White-Spunner, D.	What is erosion?	Departmental
White-Spunner, D.	Raindrops cause erosion	Departmental
Wilson, G. J.	Sprinkler irrigation: Assistance for tobacco	*Tobacco Forum of Rhodesia*
Wilson, G. J.	Save water by mulching	*Bulawayo Chronicle*
Wilson, G. J. and Watermeyer, J. M.	Hints on irrigation planning under drought conditions	*Rhodesian Farmer*
Winkfield, R.	Looking back	*Rhodesian Tobacco Journal*
Winkfield, R.	Looking forward	*Rhodesian Tobacco Journal*
Young, J.	Start grading your 1973–74 tobacco crop now	*Tobacco Today*
Young, J.	Should I plant burley this coming season?	*Tobacco Today*
Young, J.	Thoughtful and early preparation essential for success	*Tobacco Today*
Young, J.	Presentation of burley tobacco for auction	*Agriculture Today*
Young, J.	Grading and presentation of Maryland tobacco	Departmental
Young, J.	Advice to new tobacco growers: Tobacco barns	Newsletter
Young, J. and du Toit, I.	Burley tobacco: An important crop for the purchase lands	*Tobacco Forum of Rhodesia*

In addition, all material published in *Kunzwa/Ukuzwa* and R.B.C. scripts prepared by the assistant publications officers is edited by the Publications Officer, as are various reports, Press releases and items of that nature. The Publications Officer has also been called upon to assist persons outside the Department.

Radio and television

Brown, J. C.	Maize lodging: Farmers' Notebook	5 minutes
Brown, J. C.	Wheat field day (R.T.V.)	2 minutes
Burgess, M. W.	Weekly Information on cotton pest incidence (24 weeks)	24 minutes
Burgess, M. W.	Cotton pest control discussion	20 minutes
Chiyoka, P. B. S.	Nhau Dzevarimi (27)	540 minutes
Donkin, D. J.	Drought management of livestock (six programmes)	18 minutes
Going, W. D.	Horticulture and vegetables (three broadcasts) (Prodorite programme)	10 minutes
Elwell, H. A.	Requirements of modern conservation systems	10 minutes
Elwell, H. A.	Soil conservation research (2)	7 minutes
Hill, J. R. C.	Veld fires	3 minutes
Jones, M. E.	Tillage bulletin	5 minutes
Jones, M. E.	Tillage methods for drought conditions	5 minutes
Kille, T.	Topical radio programmes (numerous)	60 minutes
Naude, J. F.	Sheep show—Farmers Notebook	4 minutes
Naude, J. F.	Sheep show—R.F.C. Farming Report	4 minutes
Naude, J. F.	Sheep show—Land Magazine	2 minutes
Naude, J. F.	Fatstock show—Farmers Notebook	6 minutes
Naude, J. F.	Fatstock show—On Camera—R.T.V.	3 minutes
Piggott, J.	N.R.B. Wankie National Park	10 minutes
Robertson, W. R.	Wankie Colliery (Economics of tobacco production) (2)	8 minutes
Robertson, W. R.	Farm viability	4 minutes
Roblin, A. J.	Bull buying—Farmers Notebook	4 minutes
Roblin, A. J.	Silage making—Prodorite (two broadcasts)	6 minutes
Schmolke, M. D.	Bees	3 minutes
Stubbs, A. T.	World animal production trends—New Zealand Television	3 minutes
Stubbs, A. T.	Carcass conformation—Farmers Notebook	10 minutes
Stubbs, A. T.	Animal production symposium (Prodorite programme)	3 minutes
Wilson, G. J.	Best use of limited water for wheat irrigation (3 × 5 minutes)	15 minutes
Watermeyer, J. M.	Water shortage areas	10 minutes
Watermeyer, J. M.	Use of limited water resources	10 minutes
Walker, M.	Grain drying	5 minutes
Young, J.	Tobacco (3)	10 minutes
Zishiri, O. J.	Nhau Dzevarimi	500 minutes

Imports—1st October, 1972 to 30th September, 1973

CATTLE

Breed	Bulls	Females	Calves	Total 1972–73	Total last year
Aberdeen-Angus	—	—	—	Nil	1
Africander	9	24	—	33	37
Ayrshire	1	1	—	2	15
Bonsmara	3	4	—	7	13
Brahman	3	14	—	17	46
Charolais	9	6	—	15	9
Drakensberger	3	—	—	3	10
Friesland	3	21	—	24	75
Guernsey	—	—	1	1	Nil
Hereford	5	—	—	5	44
Jersey	1	3	—	4	40
Santa Gertrudis	1	—	—	1	1
Shorthorn	2	—	—	2	7
Simmentaler	14	5	—	19	112
South Devon	2	—	—	2	Nil
Sussex	6	10	—	16	6
Totals	62	88	1	151	416

SMALLSTOCK

Sheep	Rams	Ewes	Total 1972–73	Total last year
Dorper	26	30	56	35
Black-head Persian	3	—	3	Nil
Hampshire Down	1	—	1	Nil
Merino—German	4	10	14	10
Merino—S.A. Mutton	1	—	1	Nil
Suffolk	3	25	28	19
Van Rooy	1	—	1	Nil
Totals	39	65	104	64
Boer goats	4	—	4	4

APPENDIX IIIB

Exports—1st October, 1972 to 30th September, 1973

Breed	Bulls	Females	Total 1972–73	Total last year
Aberdeen-Angus	64	30	94	14
Africander	28	8	36	45
Ayrshire	—	—	Nil	1
Brahman	46	—	46	13
Charolais	1	—	1	2
Friesland	3	—	3	5
Hereford	30	75	105	14
Jersey	—	24	24	Nil
Santa Gertrudis	1	—	1	2
Simmentaler	—	—	Nil	3
Sussex	54	36	90	12
Tuli	—	—	Nil	9
Totals	227	173	400	120

Note.—The above figures are in respect of *Registered* breeding stock only.
The total export figure reported last year (3 280) included unregistered stock.

APPENDIX IVA

Training

Courses run at Salisbury and Domboshawa Training Institute

	Number of courses	Trainee/ training days	Participants	
			Conex	Others
Salisbury:				
(*a*) Conex	14	884	182	7
(*b*) Internal Affairs	11	760	—	145
(*c*) R. & S.S.	3	154	—	35
Domboshawa*	40	4 415	293	716
Totals	68	6 213	475	903

* Including courses held at provincial venues by Domboshawa staff.

APPENDIX IVB

Training

Courses organized at district and provincial level

Province	Number of courses	Participants	
		Conex	Others
Manicaland	21	100	104
Mashonaland North	35	327	50
Mashonaland South	32	151	498
Matabeleland	6	47	75
Midlands	5	35	—
Victoria	7	67	—
Totals	106	727	727

APPENDIX V

Soil conservation

Province	Contour ridges and storm drains			Waterways pegged (km)	Roads pegged (km)
	Pegged (km)	Constructed (km)	Area protected (ha)		
Manicaland	933	959	4 633	76	23
Mashonaland North	5 771	5 693	22 320	137	147
Mashonaland South	1 182	1 100	5 565	68	36
Matabeleland	181	161	854	2	11
Midlands	400	358	1 234	45	54
Victoria	426	406	776	12	39
Totals	8 893	8 677	35 382	340	310

APPENDIX VI

Water conservation

Province	No. of dams and weirs constructed under Conex supervision	Capacity (10^3m^3)	
		Total	Average
Manicaland	42	313,40	7,46
Mashonaland North	63	2 147,70	34,09
Mashonaland South	14	1 071,30	76,52
Matabeleland	7	63,00	9,00
Midlands	34	1 224,20	36,00
Victoria	2	6,90	3,45
Totals	162	4 826,50	29,79

APPENDIX VII

Dams constructed under Conex supervision

Province	Farmers and contractors				Government units Earth dams	
	Earth dams		Weirs			
	No.	%	No.	%	No.	%
Manicaland	37	88	4	10	1	2
Mashonaland North	57	90	1	2	5	8
Mashonaland South	8	57	Nil	0	6	43
Matabeleland	6	86	1	14	Nil	0
Midlands	26	76	2	6	6	18
Victoria	2	100	Nil	0	Nil	0
Totals	136	84	8	5	18	11

Record of general extension work: purchase lands

	Manica-land	Mashona-land North	Mashona-land South	Matabele-land	Midlands	Victoria	Total
Number of:							
Master farmers	838	1 272	1 031	94	865	1 276	5 376
Master farmers qualifying during the year	—	7	2	1	—	4	14
Master farmers in training	24	80	94	30	—	40	268
Co-operative farmers	1 396	598	698	645	917	1 561	5 815
Farm carts in use	1 118	1 678	1 379	754	1 156	1 855	7 940
Farmers using fertilizers	713	652	1 292	123	694	629	4 103
Farmer days	241	88	104	42	53	196	724
Farmers attending field days	14 769	5 063	8 533	1 000	4 430	9 575	43 370
Agricultural shows	8	2	7	1	11	3	32
Training centres in use	10	8	11	3	—	13	45
Training centres constructed during the year	1	1	—	1	—	—	3
Tractors	76	324	234	23	20	48	725

APPENDIX IX

MEETINGS ATTENDED BY CONEX STAFF

African Farmers' Liaison Committee with the Ministry (Director)
African Purchase Land local and group conferences (GC & EO & EOs)
Agricultural Finance Corporation (PC & EOs)
Agricultural Land Settlement (PC & EOs/GC & EOs)
Agricultural Research Council, Research Policy Committee (CHO, SAHS)
Alvord Institute Training conferences (PC & EO)
Animal Transport Committee (A & PS)
Association of Scientific Societies of Rhodesia (SAHS)

Beef Performance Testing Scheme Reorganization (SAHS)
Bulawayo Agricultural Society (APC & EO)

Cane Planters' Association (PC & EO)
Central African Standards' Association Technical Committees (CE)
Central African Standards' Association Committee on Aparian Products (Senior Apiculturist)
Central African Standards' Association Stockfeeds Committee (SAHS)
Charter Trials Committee (A & PS)
Chibero College Council (AD (F))
Chipinga Coffee Experiment Station Liaison Committee (PC & EO)
Chiredzi Stock Owners' Association (A & PS)
Commerce and Industry—Exports (SAHS)
Committee on Co-ordination of Cloud Seeding Experiment (AD (T))
Conex Working Party on Handling Facilities (A & PS)
Cotton Research Liaison Committee (CHO)
Crop Forecasting Committee of Controlled Products (Senior Agronomist)
Crop Cultivar Committee (Senior Agronomist, CHO)
Crop Variety Release Committee (CHO)

Darwendale Dam Liaison Committee (Irrigation Specialist)
Deciduous Fruit Growers' Association of Rhodesia (Senior Agronomist)
Devuli Ranch Board of Directors (A & PS)
Dorper Sheep Breeders' Association (A & PS)
Drought Relief Committee (PC & EO. SFMS)

Executive Committee of the Rhodesia Bee-keepers' Council (Senior Apiculturist)
Executive Committee of the Mashonaland Bee-keepers' Association (Senior Apiculturist)

Farmers' Associations (A & PS and Field staff)
Fatstock Association (A & PS)
Fertilizer Advisory Committee (CHO. Senior Agronomist)
Forum Editorial Committee (CHO)
FFHC National Committee (AD (F))

Government Civil Engineering Advisory Committee (AD (T))
Government Liaison Committee with Civil Engineering Industry (AD (T))
Government Library Liaison Committee (CTO)
Grain Competition Judges' Committee (Senior Agronomist)
Grain Research Liaison Committee (SFMS, CHO, Grain Specialist)
Grasslands Liaison Committee (PC & EO, A & PS, CHO)
Grasslands Society of South Africa 8th Congress (SPS, SAHS, A & PS)
Grasslands Society Organizing Committee (SPS)
Gwanda Show Committee (GC & EO)
Gwebi College Council (Director)

Hartley–Gatooma Water Development Committee (GC & EO)
Hunyani River Water Shortage Committee (Irrigation Specialist)

ICA Committees (Field staff)
Information Services—Cattle Films (SAHS)
Influx Committee (CTO)
Insiza Rural Council Roads Committee (EO)
Internal Affairs Irrigation Policy (Senior Agronomist)
Internal Affairs Team (Field staff)
Inter-nation Commission on Irrigation and Draingage (CIO)
Inyanga Show Society (EO Inyanga. Horticulturist, Rusape)
Irrigation Association of Rhodesia (Executive Committee) (CIO)
Irrigation Co-ordinating Committee (CIO)
Irrigation Co-ordinating Committee Midlands (Irrigation Specialist)
Irrigation Co-ordinating Committee Victoria (APC & EO. Irrigation Specialist)
Irrigator of the Year Planning Committee (CIO. Senior Agronomist)

Lesapi Dam Committee (PC & EO)
Livestock Improvement Committee (Director—Chairman, SAHS)
Livestock, Veld and Pasture Research Committee (SAHS)
Lowveld Research Liaison Committee (PC & EO, CHO)

Macheke Management Advisory Committee (GC & EO)
Makoni Rural Council Water Development Committee (CIO)
Makoholi Research Liaison Committee (PC & EO, A & PS)
Manicaland Agricultural Society (PC & EO)
Manicaland Branch of the Ploughing Association (PC & EO)
Manicaland Publicity Association (PC & EO)
Marandellas Area Water Committee (PC & EO)
Marandellas Management Advisory Committee (GC & EO)
Marandellas Show Society (A & PS)
Marodzi River Water Shortage Committee (Irrigation Specialist)
Mashona Cattle Society (SAHS)
Matabeleland Development Council (PC & EO)
Matopos Research Liaison Committee (PC & EO)
Mazoe River Water Shortage Committee (CIO, Irrigation Specialist)
Metrication Council—Agricultural Technical Services (Senior Agronomist, AE(T))
Metrication Council—Pesticide Subcommittee (Senior Agronomist)
Midlands Research Liaison Committee (PC & EO)
Ministry of Agriculture—Irrigation Development Committee (CIO, CPO)
Ministry of Agriculture—Library Committee (CTO—Chairman, PO)
Ministry of Agriculture—Publicity Committee (AD(T), PO)
Ministry of Agriculture—Subdivision Committee (CPO)

National Executive Committee of YF/NR Clubs (CTO)
Natural Resources Board (Director)
NRB Conservation Education Committees (PC & EOs, GC & EOs)
NRB General Purpose Committee (AD(F))
NRB Mineral Resources Committee (AD(T))
NRB Resource Education Committee (CTO)
NRB Wild Life Conservation Committee (CPO)
Nut (Macadamia) Producers' Association of Rhodesia (Senior Agronomist)
National Canners' Liaison Committee (PC & EO Horticulturist)
Nyamandhlovu Aquifer Watchdog Committee (PC & EO)

Odzani and Umtali Irrigation Board (EO Umtali North)
Oilseeds Competition Judges' Committee (Senior Agronomist)
Oilseeds Research Liaison Committee (CHO, Oilseeds Specialist, CE)

Potato Research Liaison Committee (Senior Agronomist)
Pig Industry Board (SAHS)
Ploughing Association of Rhodesia (AE(F)—FMTS)
Provincial and District Conferences (PC & EOs)

RAJ Editorial Committee (AD(F), CTO, PO)
Regional Committees of YF/NR Clubs (SYES)
Re-use of Effluent Advisory Committee (CIO)
Rhodesia Cotton Growers' Association (AD(T), Cotton Specialist)
Rhodesia Crop Science Symposium (SFMS, Senior Agronomist, CHO)
Rhodesia Crop Seeds Association (Senior Agronomist)
Rhodes Inyanga Experiment Station Liaison Committee (Horticulturist, Rusape)
RNFU Branch (Field staff)
RNFU Cattle Committees (Field staff)
RNFU Commodity Committees (Field staff)
RNFU Labour Committee (SFMS)
RNFU Management Education in Agriculture (SFMS)

RNFU—Ministry monthly meetings (Member of Directorate)
Rhodesia Air-cured Association (Senior Tobacco Specialist)
Rhodesia Agricultural and Horticultural Society Cattle Committee (AS)
Rhodesia Branch of SASAP (SAHS and A & PS)
Rhodesia Cattle Producers' Association (A & PS)
Rhodesia Oilseeds Producers' Association (Oilseeds Specialist)
Rhodesia Oriental Tobacco Association (Senior Tobacco Specialist)
Rhodesia Mushroom Growers' Association (Senior Agronomist)
Rhodesia Potato Producers' Association (Senior Agronomist)
Rhodesia Ecological Committee for the Conservation of the Environment (RECCE) (CTO)
Rhodesia Registered Cattle Breeds Council (SAHS)
Rhodesia Seed Potato Assbciation (Senior Agronomist)
Rhodesia Sheep Producers' Association (A & PS and SAHS)
Rhodesia Society of Animal Production (A & PS)
Rhodesia Tobacco Seed Association (Senior Tobacco Specialist)
Rhodesia Viticultural Association (Horticulturist)
Rothman Growers of the Year Judges' Committee (CHO)
Rural Councils (when required) (District staff)

SARCCUS (Director)
SARCCUS Agricultural Engineering Subcommittee (CE—Chairman)
SARCCUS Standing Committee on Erosion and unoff Control (CE)
SARCCUS Standing Committee for Extension and Education (CTO—Chairman)
SARCCUS Subcommittee on Land Use Planning and Farm Business Management (CPO)
Shamva Rural Council Development Committee (FMS and IO by invitation)
Sheep Research Liaison Committee (A & PS)
Simmentaler Cattle Club (AS)
Soil Balance Committee of the University of Rhodesia (Conservation Engineer)
Soil Survey Liaison Committee (CIO, SPS)
South African Society of Animal Production (SAHS, A & PS)
SASAP Symposium Organizing Committee (A & PS)
Soya-bean Flood Irrigation Investigation Committee (Senior Agronomist)
Stockowners' Association (A & PS)
Standing Committee on Farm Mechanization (AD(T) and CE)
Standing Committee on Re-use of Effluents (CIO)
Sunflower Production Planning Committee (Senior Agronomist)

Tillage Trials' Committee (AE(T) and CE)
Tobacco Marketing Board (CHO)
Tobacco Research Board (Director)
Tripartite Agreement Meeting on Seed Maize (Senior Agronomist)

Umkauzaan Problem Meeting (A & PS)
Umniati River Complex Planning Committee (PC & EO)
Umshandige Water Board (PC & EO)
Umwindzi River Water Shortage Committee (Irrigation Specialist)

Vlei Utilization Committee (CPO, Senior Agronomist, AE)
Veld and Pasture Research Liaison Committee (SPS)
Victoria Stockowners' Association (A & PS)

Water Pollution Advisory Board (CIO)
Water Reservations' Committee (CIO)
Weaner Committee (Headlands) (GC & EO, Rusape)
Wengi Proving Unit (PC & EO, GC & EO Mazoe, Irrigation Specialist, Secretary)

YFC Council (SYES)

III World Congress of Animal Production—Australia (SAHS)

APPENDIX X

Veld Management

Systems planned by the Department of Conservation and Extension during the year ended 30th September, 1973

	Conex plans completed				Farmer courses and field days	
	Systems not operating		Systems operating			
	Plans	Hectares	Plans	Hectares	Number	Attendance
Short duration grazing						
Manicaland	177	15 818	188	52 377	39	935
Mashonaland North	4	6 438	5	5 259	19	1 506
Mashonaland South	8	21 348	8	12 461	8	207
Matabeleland	2	4 346	1	5 363	12	138
Midlands	175	211 313	87	352 826	17	1 231
Victoria	13	1 230	203	10 308	40	4 146
Totals	379	260 493	492	438 594	135	8 163
Other approved grazing systems						
Manicaland	—	—	64	4 553		
Mashonaland North	46	9 709	58	4 674		
Mashonaland South	3	2 418	1	300		
Matabeleland	—	—	—	10 221		
Midlands	2	274	—	—		
Victoria	3	1 800	—	—		
Totals	54	14 201	123	19 748		
Grand totals	433	274 694	615	458 342		

Total area planned during year ended 30th September, 1973 . . 733 036 hectares
Total area planned to date . . . . . 6 401 316 hectares
Total farming area (excluding T.T.L.s) . . . . . 16 473 493 hectares
Percentage planned to date 38,9%

Annual Report of the Director of Veterinary Services

for the year ending 30th September, 1973

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General

IN common with many countries in the northern part of Central Africa, Rhodesia suffered a severe drought this year. Drought is no stranger to this country but seldom has its effect encompassed the whole territory. Promising early rains in October were followed by negligible falls in the succeeding two months, and no rain of any consequence fell after February. In consequence the replanted crops failed to mature and yields varied from nil to poor. Only in isolated pockets in the north-east of the country were grain crop returns reasonable.

Other than in the habitually over-grazed Tribal Trust Lands, there was sufficient growth of grass to prevent severe mortality but the position was naturally aggravated by lack of open water. Regular dipping of cattle had to be abandoned in most Tribal Trust Lands.

Disease summary

The year commenced in October, 1972, with the outbreak of foot and mouth disease, diagnosed in Ndanga T.T.L. on the 23rd September, still very active. Since the infection was in a large communally grazed area and adjoined other unfenced African areas, the only possible line on which to establish a defensive cordon was on the perimeter where these areas bounded fenced European-owned properties. Cordons were accordingly placed on these boundaries and infection contained within the Victoria Province at all times. Infection in the African-owned areas died out rapidly after aphthization with the natural virus, but persisted for many months on ranches to the south due to a residual smoulder in susceptible game animals. The infecting virus in this outbreak proved to be South African Type II commonly referred to as SAT II.

On the 16th October, a second and unassociated outbreak was confirmed in African-owned cattle at Pesu dip tank on the Limpopo River. This river forms the boundary between Rhodesia and the Kruger National Park in the Republic of South Africa, from where the infection (SAT I) no doubt originated. SAT I virus had not been confirmed in Rhodesia since 1966, whereas it was identified in game animals in the Kruger Park in 1971. This infection was most successfully confined to Sengwe T.T.L. and promptly died out after virusing all stock in the infected area.

Our troubles in this southern border area were not at an end, however, because one month later, on the 13th November, a focus of SAT II infection was detected in the adjacent European-owned ranching area. This virus gained entrance to one dip tank in Sengwe T.T.L. and caused active disease in the cattle which had barely recovered from the SAT I outbreak one month earlier. The type II virus continued to smoulder in game on the ranches for many months but, following repeated blanket vaccination of all domestic stock on properties in a wide surrounding area, was finally contained.

The only other serious epidemic type diseases encountered during the year were Newcastle disease and Rabies. The former has continued to smoulder in African-owned poultry and must now be considered as enzootic. Similarly, Rabies remained a problem with 102 confirmed cases in comparison with 106 detected in 1972.

Good progress was again made in the reclamation of large tracts of land from the tsetse fly, our greatest veterinary problem.

Staff

Veterinary officers

The table below shows the veterinary officer position over the past four years:

	1970	*1971*	*1972*	*1973*
Establishment	46	46	48	48
Permanent	35	40	42	42
Contract	1	1	1	1
Temporary	2	2	2	2
Vacant posts	8	3	3	3

During the year two resignations were received and two officers were recruited. Two students due to qualify at the end of 1974 are financially bonded to the Department and nine other Rhodesian students are at various stages of their degree course.

Animal health inspectors

Once again it is my privilege to acknowledge the excellent service given by our Animal Health Inspectors and Tsetse Field Officers. Both have a very arduous daily routine often under the most trying conditions in the field and we are most grateful for their loyalty and perseverence.

Training courses

The courses held by our two Training Officers at numerous centres throughout the country give excellent value to our own staff, the Ministry of Internal Affairs and a wide section of persons concerned with disease control, as is evident from the formal sessions listed below:

12 × 5 day courses for Animal Health Inspectors
16 × 2 day courses for Dip Attendants
21 × 1 day courses for Dip Attendants
2 × 2 day courses for Field Assistants
55 × 1 day dipping courses for Chiefs, Headmen and Councillors
47 lectures at Domboshawa and Gwebi Agricultural College
4 × 4 day courses for Field Orderlies.

The resignation of Mr. H. B. Bezuidenhout, Assistant Training Officer, is recorded with regret for few Europeans can speak Shona as fluently or have a better understanding of the African's mind.

Meat Inspection Staff

At the end of the period under review (30th September, 1973) the position was as follows:

Post	*Establishment*	*In service*	*Vacancies*
Senior Meat Inspection Adviser	1	1	0
C.V.P.H.O.	1	1	0
V.P.H.O.s	2	2	0
Chief Meat Inspector	1	0	0
Abattoir Supervisors	4	4	0
Senior Meat Inspectors	6	5	1
Meat Inspector/Learner Meat Inspectors	41	34	7

These posts together with a supporting Laboratory Technician, Clerk/Typist and meat inspection assistants, bring the total establishment to 80 persons, excluding a number of ungraded labourers. This represents a considerable increase during the past 12 months, mainly in the meat-cum-learner meat inspector bracket, occasioned by the continued increase in slaughterings at all existing centres, plus the necessity to provide trained staff for the Marandellas centre, which is scheduled to come on-stream during the current financial year.

The working pressure on staff, most of whom are lacking experience, has once again been acute, with many hours of overtime duty representing the extended hours of slaughter which must be staffed, particularly in Salisbury C.S.C. where 12- or even 14-hour days no longer excite comment other than justified complaint. Although there has, inevitably in the circumstances, been difficulty in maintaining high and uniform standards of inspection at all times during the past year's kill—yet another large increase over the previous year's record total—the whole inspectorate staff has stuck to the task admirably. Special recognition is due to the Officer in Charge of this service, Dr. J. T. R. Robinson, who carries the responsibility for organizing and training this sector.

Tsetse Control Branch

One glossinologist resigned and two were recruited, leaving one vacancy still to be filled. Twenty-one Tsetse Field Officers were recruited and 17 resigned, again leaving three posts still vacant.

Housing and Office Accommodation

Six Animal Health Inspector stations have no resident inspector due to lack of accommodation and the areas have to be covered from the district or provincial centres. This is inconvenient for the public and wasteful in mileage. The two houses nearing completion at Chipinga will solve a chronic problem there.

Veterinary Department Head Office joined the Ministry in their new premises in Fletcher Building in December, 1972, and our former offices were taken over by the Tsetse Branch Mapping Section. The Department is also scheduled to take over a section of the former University Farm as a field station and a $350 000 block of new laboratories to accommodate the Veterinary Research staff and Tsetse Control Branch will be commenced in July, 1974. We are grateful to Government for this consideration when there are so many other demands on the public purse. Also at the Laboratory an isolation stable, new housing for inoculated small animals and an improved rabies diagnostic unit were commissioned.

Livestock

The total number of cattle in Rhodesia increased by 61 849 being due to an increase of 172 994 head of African-owned animals and a decrease of 111 145 European-owned stock. For the first time ever, therefore, the African-owned herd at 3 062 581 exceeds three million head, which is 54 per cent. of the national herd. For the second successive year there was a decrease in the European holding, and the slower over-all growth rate is evidenced by the figures below:

Year	*European-owned cattle*	*African-owned cattle*	*Total*
1972–73	2 572 810	3 062 581	5 635 391
1971–72	2 683 955	2 889 587	5 573 542
Difference	−111 145	+172 994	+ 61 849
1971–72	− 25 042	+ 45 610	+ 20 568
1970–71	+230 354	+114 391	+344 745
1969–70	+253 585	+176 895	+430 480
1968–69	+244 502	+ 51 557	+296 059
1967–68	+173 624	+163 609	+337 233
1966–67	+102 971	+198 325	+301 296
1965–66	+ 46 999	− 61 815	− 14 816

The decrease in 1965–66 was due to a catastrophic drought in the southern province and African-owned stock particularly died by the thousand. This year, although the drought was most serious in respect of crop yields, animals were adversely affected to a much lesser extent.

Beef Cattle

Cattle remain the most stable farming enterprise, and beef prices were increased by 5 per cent. on three occasions during the year thereby giving the industry a much needed fillip to help off-set its continual rising costs of production. The potential for increased production would appear to be mainly in increased supplementary feeding of breeding herds as the veld is largely stocked to gazing capacity, and the present low level of nutrition is responsible for the poor calving percentage on many properties. This, in turn, depends on cheap maize, which would also assist the feeder, whose profit margin has been squeezed by the high prices he must now pay for feeders.

A new development this year was the large scale pen feeding at C.S.C. holding grounds. Although this was essentially a drought relief measure it could be the first step in an important future pattern if the final economics are within reason.

Our apprehension on the future growth of beef production is expressed by Dr. J. T. R. Robinson who comments as follows:

"The annual beef kill has increased by 125 per cent. in four years which is all very well if we are not eating into the capital reserves of our national herd. It appears that this year we have done exactly that, with a decrease of over 100 000 head in the European-owned herd. As a salvage exercise in a drought year there is reason to be content that high slaughter figures bring about a reversal of the national herd growth trend, but there is a danger of a sort of bovicidal mania for capitalizing on favourable markets for beef which pays insufficient heed to conserving resources to keep those markets supplied in the coming years."

Dairy Cattle

Last year's record milk production was again exceeded by some 12 per cent. and payment to the producer at 7,18 cents per kilo was the highest

price for several years. Mastitis continues to be the most important disease in these herds.

Sheep

The number of sheep slaughtered at C.S.C. abattoirs increased from 42 000 to 45 000 but is still some 20 000 less than in 1970. The slight increase was due to improved prices being paid at these centres and does not indicate any growth in the industry, which in point of fact shows a decrease of 20 000 head to 253 000 in the European-owned flock. Sheep owned by Africans increased by 10 000 to 471 000.

Demand for good mutton and lamb exceeds supply but at the price of 75 cents/kg cold dressed weight for super lamb to the producer the market is limited.

No serious disease problems were encountered and the introduction of an improved entero-toxaemia vaccine, which gives immunity for one year, should reduce losses from this condition.

Goats

Goat numbers, almost entirely owned by Africans, increased by 206 000 (11 per cent.) and have now reached an all-time high of 1 842 000. In spite of this all efforts by the Ministry of Internal Affairs and private enterprise have not been able to establish a regular supply of slaughter goats for existing and potential export markets. These animals are a very useful and economical source of meat to the owners.

Pigs

Pig numbers increased by 15 000 head and now total just over 200 000, owned almost equally between the two sectors of the community. Animals slaughtered also rose by 16 000 indicating a new confidence in this industry as also does the opening of new Colcom abattoirs at Bulawayo and Fort Victoria. These two new works mean the end of pig slaughterings at C.S.C. beef export abattoirs.

Disease entities encountered were limited to those associated with management.

Poultry

Commercial flocks now have some 4 200 000 birds and the technical expertise and proven stock of the larger producers have ensured a high quality product at prices which are within the means of most families. These flocks remained singularly free of Newcastle disease, even although this must now be considered as enzootic and a constant threat. The disease continues to smoulder in the Tribal Trust Lands where the African owners are least able to protect their birds by vaccination.

Game Ranching and Safaris

The idea that land could be more profitably used by the cropping of game for sale as venison than for cattle ranching has fortunately lost credence. The use of such areas for mini-safaris, either for photography or sport hunting is a much more realistic and profitable development. Under this system the meat is merely a useful by-product and there is some hope that the natural increase of the various species of game will be able to keep pace with the more restricted demands of sport hunters. All true lovers of game were revolted by the former indiscriminate slaughter which was encouraged by the payment of hunters on the weight of saleable meat delivered.

There is an increasing interest in the conservation and on many farms the reintroduction of certain species of game, and as a Department we welcome this enthusiasm provided the animals are not moved without our knowledge and do not include buffalo and warthog. Regulations controlling the movement of these two species throughout Rhodesia and the movement of other game from certain foot and mouth disease prone areas were introduced at the beginning of 1973.

There is no doubt, however, that game in foot and mouth prone border areas constitutes a serious potential for the spread of this disease to adjacent properties.

BORDER CONTROL

Lundi–Limpopo Game Fence

This game fence was erected in 1962 and has been markedly successful in diminishing the incidence of foot and mouth disease outbreaks in that corner of Rhodesia. The fence is 176 km long and constructed of 10 strands of high tensile wire on 2,3 m hardwood poles. In the south it is supplemented by a parallel cattle fence from the Limpopo to the Nuanetsi River thereby ensuring a stock-free corridor along this sector, where the greatest danger of contact exists. At the northern end an all-metal game fence is being built parallel to this fence at a distance of three and a half kilometres from the border. In the corridor between these fences small herds of departmental cattle are being kept at strategic points to detect any re-invasion of the tsetse fly belt, which has now been pushed back some 80 kilometres into Moçambique. It may be remembered that six years ago this fly belt extended well into Matibi II Tribal Trust Land 65 kilometres within the border. Apart from the tsetse control aspect this game fenced corridor will serve a most useful obstacle to the invasion of foot and mouth disease.

Kazangula Game Fence

This 120 km game fence stretches down the Botswana border to Panda-ma-tenga. It was built some 14 years ago to break the contact between cattle in the Matetsi area and the game and cattle living in Botswana. However, now that all cattle are to be removed from Matetsi, the new game frontier will be the Matetsi Game Fence on the east of the area. It is our intention therefore to convert the border game fence into a cattle fence except for a 20 km section at the northern extremity.

The Matetsi Game Fence

The final section of this game fence will link up with the Wankie Game fence in the vicinity of Dett in 1974, thereby giving a continuous game fence

from the Zambezi River to Beacon 171 on the Botswana border some 75 km west of Plumtree—a total distance of some 600 km.

Cattle Fences

Numerous foot and mouth disease control fences in the lowveld continue to be well maintained and are added to whenever funds are available.

Quarantine Camps

The Department runs eight veterinary quarantine camps in the lowveld of Fort Victoria Province. These camps are strategically situated on the various cattle exit routes and ensure that any cattle moving from this foot and mouth disease prone area to other parts of the country undergo a 10-day detention period. The stock are inspected on arrival, again five days later, and finally immediately before release. They also undergo three dippings and charges to the owner are limited to three cents per head for each dipping.

Imported stock are detained at the Bulawayo Veterinary Quarantine Yards for tuberculin testing in the case of cattle and to check whether other import and export conditions have been fulfilled in respect of all animals. Income from this source amounted to $5 551 from the 994 head of stock which were handled there this year.

TICK LIFE AND DIPPING

Until last year my annual reports have regularly drawn attention to a deterioration in the standard of tick control, particularly in the African areas. In 1971, due to a serious and rising degree of tick resistance to arsenical dips, the Ministry of Internal Affairs was prevailed upon to change to an organophosphatic dip in place of arsenic, which had been used for the previous 50 to 60 years. The change could not be accomplished overnight since it involved a six-fold increase in the cost of dip concentrate, a reassessment of dip fees and the training and instruction of well over one thousand persons concerned. In addition, that Ministry took the opportunity of renovating and improving facilities at many dip tanks, particularly the improvement of water supplies. The exercise has been a major undertaking and long overdue. Our own staff contributed very substantially by calibrating dip tanks, training supervisory Internal Affairs staff and developing a routine which would ensure an up to strength dip wash.

It is most gratifying therefore to record the great improvement that has taken place. The number of quarantine orders for tick infestation issued in recent years is as follows:

	European-owned	*African-owned*	*Total*
1970–71	1 003	1 458	2 461
1971–72	967	1 314	2 281
1972–73	774	416	1 190

The position in the Tribal Trust Lands where dip tanks are still operated by the Ministry of Internal Affairs, is, in fact, much better than the above figures indicate because the 416 total for 1972–73 includes quarantine orders issued to owners in African Purchase Areas and to dip tanks run by African councils. For instance in the Lomagundi district the 16 quarantine orders recorded against African owners were all issued to purchase area farmers. Not a single quarantine order was issued to tanks run by the Ministry of Internal Affairs, and this in a district where a few years ago both Zwimba and Urungwe T.T.L.s were continuously tick infested.

The areas where dip tanks are run by African councils are still a problem because some of these bodies like to spend the revenue from dip fees on anything but dipping. A typical example is Mondoro T.T.L. which accounted for 73 quarantine orders out of the total 229 issued within the whole province. Our patience in such circumstances will not last indefinitely.

If the above results can be achieved by the Ministry of Internal Affairs there is no good reason why European stock-owners should not achieve a similar reduction. Unfortunately there is a small minority of cattle owners who still try to get by with as little tick control as possible and who are quite happy to have tick infested stock if they do not require a cattle movement permit. Such people deceive nobody but themselves. They bear the cost of doing the job badly, which is no less than the cost of doing it well, and they get none of the benefits which good tick control would give them. The *Rhodesian Farmer* kindly published a series of articles on tick control, but we fear the persons to whom these were directed are the least likely to heed advice.

Contraventions

	Persons	*Fines* $	c
Cattle Cleansing Regulations	975	10 575	50
Movement of Cattle Regulations	31	370	00
Rabies Regulations	205	1 908	00
Trypanosomiasis Regulations	47	590	00
Stock Register Regulations	61	312	00
Foot and Mouth Regulations	43	486	00
Animal Health Act	109	778	00
Cruelty to Animals Act	19	238	00
Miscellaneous Offences Act	7	46	00
Pounds and Trespass	1	20	00
Total	1 498	$15 323	50
1971–72	2 058	$18 442	00

Cattle Inspections

District	*European*	*African*	*Total*
Mashonaland	2 276 910	1 327 349	3 604 259
Matabeleland	1 117 024	3 909 597	5 026 621
Manicaland	505 186	1 766 333	2 271 519
Midlands	820 391	1 577 273	2 397 664
Victoria	2 523 613	3 098 721	5 622 334
Sinoia	942 764	533 550	1 476 314
Gwanda	1 287 984	2 176 553	3 464 537
Chipinga	80 488	800 025	880 513
Total	9 554 360	15 189 401	24 743 761
1971–72	9 960 831	14 916 081	24 876 912

Cattle Sales

European

	Sales	*Yarded*	*T.I.*	*Sold*
Mashonaland	176	89 608	2 200	78 947
Matabeleland	103	25 738	157	21 382
Manicaland	38	33 172	544	28 526
Midlands	121	84 687	2 695	67 626
Victoria	10	6 472	—	5 696
Sinoia	57	27 597	490	24 835
Gwanda	10	5 281	11	4 583
Chipinga	3	1 316	—	1 216
Total	518	273 871	6 097	232 811
1971–72	659	295 389	7 027	234 734

African

	Sales	*Yarded*	*T.I.*	*No bids*	*Re-jects*	*Re-fusals*	*Sold*
Mashonaland	64	8 006	214	—	515	1 788	5 489
Matabeleland	204	31 318	63	—	312	3 636	27 307
Manicaland	43	9 263	21	—	3	2 120	7 119
Midlands	92	18 651	38	125	2	4 581	13 905
Victoria	85	19 978	63	—	68	3 745	16 102
Sinoia	12	1 302	—	—	17	254	1 031
Gwanda	68	21 673	4	523	84	1 706	19 356
Chipinga	24	3 813	2	—	32	385	3 394
Total	592	114 004	405	648	1 033	18 215	93 703
1971–72	599	88 045	911	70	407	16 999	69 662

The following table shows the number and percentage of African cattle sold in each district:

	Total African cattle	*No. sold*	*% 72–73*	*% 71–72*	*% 70–71*	*% 69–70*	*% 68–69*
Mashonaland	598 644	5 489	0,92	0,68	0,14	1,32	1,72
Matabeleland	556 139	27 307	4,91	3,94	5,13	4,25	3,53
Manicaland	406 228	7 119	1,75	0,90	1,56	2,08	1,60
Midlands	520 466	13 905	2,67	1,97	2,19	2,66	1,65
Victoria	598 987	16 102	2,69	2,43	4,71	4,27	5,18
Sinoia	98 984	1 031	1,04	0,15	0,63	0,75	0,66
Gwanda	205 331	19 356	9,43	9,04	9,50	9,95	8,92
Chipinga	77 802	3 394	4,36	3,26	6,28	7,66	9,34
Total	3 062 581	93 703	3,06	2,41	3,40	3,47	3,56

The number of African-owned cattle sold at Ministry of Internal Affairs organized sales has increased from 69 662 in 1972 to 93 703 this year. The increase of 24 041 head is a slight improvement, but the gross figure of 93 703 from a national African-owned herd of 3 062 581 represents an off-take of only 3,06 per cent. Admittedly a few, certainly less than 5 000 head, of supplementary fed cattle are marketed direct to the C.S.C. abattoirs and a few more thousand are killed by local butchers, but these additional animals would have to total 24 500 before the off-take would reach even 4 per cent.

One would have less criticism of this negligible off-take figure if the increase in the number of cattle was in any way a national capital gain. This is unfortunately not the case, because the Tribal Trust Lands are already grossly over-grazed and any increase in total head merely aggravates the nutritional problem and increases the number dying from poverty. Towards the end of the period under review (30th September) hundreds of cattle were dying each week and there was still October and November to weather before grazing would improve appreciably.

SPECIFIED DISEASES

Viral diseases

Foot and Mouth Disease: The period under review opened with the outbreak in Ndanga T.T.L. (confirmed on 23rd September) still in its early stage. As the infected stock were in a large communally grazed area and adjoined other such T.T.L.s without a single intervening fence, it was obvious that no tenable cordon line, with the necessary stock-free zones on either side, could be established within these areas. Accordinlgy we concentrated on establishing cordons on the fenced perimeter and on one sector erected a 60-kilometre fence where none existed. Cattle, sheep and goats on the exterior of the cordon were vaccinated with the appropriate monovalent SAT II vaccine and revaccinated 14 days later. Stock pressure was extremely heavy on certain sectors of the cordon as evidenced by the unfortunate fact that some 100 cattle and twice this number of small stock had to be shot when they infringed the stock-free zones. All stock within the cordon, numbering in excess of 100 000, were inoculated with natural virus where infection died out rapidly except on one front where infection entered a European-owned ranch.

Meanwhile the original focus of disease, from where infection had been carried into the communally grazed T.T.L., had been discovered in game in a large tract of vacant land. It can only be assumed that poachers transported infection by way of infected meat into the T.T.L., because the cattle there had been free of foot and mouth disease since 1953.

Unfortunately while these operations were in progress another outbreak was detected in cattle living on the Limpopo River some 200 kilometres to the south in the Nuanetsi district. It is believed that this infection, which proved to be SAT I, came from the Kruger National Park where a similar virus was confirmed in 1971. The Kruger Park lies to the south, immediately across the Limpopo River from the dip tank at which infection appeared. The SAT I infection was contained within the initial area and died out after virusing without any extensions whatsoever.

Our troubles were not at an end, however, because SAT II infection was soon to appear on a ranch in the adjacent area of the Nuanetsi district. The disease was either introduced by game or subsequently got into game from the cattle. Whatever the initial sequence it continued to smoulder in various species of antelope, including kudu, impala, nyala and eland for several months. Owing to severe drought conditions which prevailed in the area, the game were forced to seek water in the cattle watering troughs and the few residual pools which remained in rivers. The protection conferred by vaccination, even by three doses of vaccine, did not entirely withstand this continuous high challenge and a number of other surrounding ranches became infected. At the end of the year under review (30th September, 1973), the disease was quiescent, but all restrictions remained in force and will continue so until there is ample evidence of the final demise of infection.

Rabies

The rabies position was largely static with cases limited to previously infected areas; the disease was confirmed in 102 animals as compared to 106 in the previous year. The table below gives the species affected with last year's figures in brackets:

Jackals	37 (53)	Civet Cat	1 (—)
Cattle	30 (18)	Polecat	1 (—)
Dogs	23 (15)	Genet Cat	1 (—)
Mongooses	4 (14)	Duiker	1 (—)
Cats	2 (2)	Goat	1 (—)
Ratel	1 (1)		

Total: 102

A sharp outbreak, initiated by jackals, occurred in the Gwanda area and on one ranch the disease was confirmed in eight cattle. The owner attributed the deaths of 21 other animals to this disease but brain specimens were not available and some of these additional deaths may have been due to botulism, which also causes degrees of paralysis. We are grateful to the Department of National Parks and Wild Life whose officers estimate that 1 167 jackals were poisoned in the district by their vermin control unit. Two hundred and one carcasses were recovered and burned. Similarly in the Odzi area rabies was confirmed in 13 jackals, one dog, one bovine and one polecat and the National Park's ranger collected 121 jackal carcasses from his poison baits.

With this sort of challenge from jackals in particular, we can take reasonable satisfaction in limiting the disease to only 23 dogs throughout the country. In this respect the performance of Mashonaland Province staff is excellent, having reduced the incidence in their sector from 50 cases last year to one positive jackal this year. Foot and mouth disease commitments weighed heavily on our staff, nevertheless they were still able to vaccinate 320 801 dogs which compares reasonably with the 323 593 vaccinations last year.

Rabies vaccinations 1972–73

	Euro-pean	*Police African*	*dogs*	*Cats*	*Total*	*Brain speci-mens*	*Posi-tive*
Salisbury	8 323	58 218	137	—	66 678	74	1
Bulawayo	5 153	49 331	46	1	54 531	92	29
Umtali	1 746	46 404	—	—	48 150	69	27
Gwelo	3 480	63 192	—	—	66 672	31	6
Victoria	825	42 775	—	—	43 600	23	5
Sinoia	1 013	13 093	—	—	14 106	11	—
Gwanda	607	13 644	—	—	14 251	55	23
Chipinga	506	12 307	—	—	12 813	35	11
Total	21 653	298 964	183	1	320 801	390	102

Total dogs vaccinated since 6th September, 1950 = 4 546 143

Positive cases in jackals

1964	Nil	1969	Nil
1965	6	1970	10
1966	124	1971	76
1967	78	1972	53
1968	12	1973	37

Total confirmed cases of rabies since 5th September, 1950

Aardwolf	4	Humans	32
Baboons	2	Hyaenas	3
Domestic cats	43	Jackals	541
Cattle	156	Leopards	1
Civet cats	5	Meercat/Mongoose	50
Dogs	1 144	Pigs	5
Donkeys	1	Ratels	15
Duikers	5	Sheep	10
Goats	1	Skunks	4
Horses	3	Squirrels	2
		Wildcat	1

Total: 2 028

By using a fluorescent antibody technique a result is usually available within two hours of a suitable sample being received. This test gives an accuracy of 95 per cent. and results are subsequently confirmed either histologically or biolocally or by both methods where there is doubt or human involvement. Three hundred and ninety brain specimens were tested of which 102 were positive.

Again I repeat my plea of previous years for landowners to play a more active part in limiting the vermin on their land for until this is done there is no prospect of eliminating rabies from the country.

Lumpy Skin Disease: Both the Allerton and Neethling viruses were encountered, more particularly in the early part of the year. Very few deaths occurred and generally cases were sporadic and mild. Sales of vaccine rose slightly from 81 400 to 93 200 this year.

African Swine Fever: There has been no evidence of this disease since March, 1971, when a small focus of infection on the banks of the Zambezi was eliminated by slaughtering the 15 remaining pigs, 10 having died within the previous few days. The owner was glad to be rid of his pigs because one had just been eaten by a leopard and another snatched by a crocodile.

Rift Valley Fever: This disease was last diagnosed in May, 1970.

Mucosal Disease: Large scale serum surveys in this country and South Africa have shown the ubiquitous nature of this condition, which seldom appears as a clinical entity. The disease was suspected on a few properties in Matabeleland and Victoria provinces.

Newcastle Disease: This condition must now be considered as firmly established in the Tribal Trust Lands in Mashonaland, and will remain a constant threat to large-scale poultry producers. Mortality was more or less confined to unvaccinated poultry in the African areas. 1 412 200 doses of Komarov, 8 825 000 doses of La Sota and 596 000 doses of inactivated vaccine were sold by the Laboratory.

Bacterial diseases

Anthrax: For the second successive year no cases were diagnosed or suspected. As is normal policy annual prophylactic vaccinations continued to be given by departmental staff to animals on pro-

perties where disease was confirmed previously. Accordingly the following stock were inoculated:

Cattle	12 496	Sheep	94
Goats	147	Donkeys	29

Total: 12 766

Tuberculosis:

Imports tested	233	cattle—one reactor
Exports tested	8 608	cattle—all passed
	6	pigs—all passed
	8 614	

The reactor detected in the imported cattle was subsequently slaughtered and infection confirmed.

Dairy herds tested: In accordance with regulations which require the testing of all herds from which any type of dairy produce is sold a further 83 herds were tested and revealed only one reactor. This animal showed no evidence of disease when the carcass was examined.

Ranch cattle: The annual testing programme continued on Liebig's ranch as in previous years. In the 8 333 animals tested eight animals were classed as reactors and 35 as retests. As usual the eight reactors were slaughtered immediately, but showed no visible evidence of infection and the retest animals were drafted for fattening and slaughter. The recent testing history of this ranch is given below:

Year	No. tested	Reactors	Positive on P.M.	Remarks
1968–69	30 417	123	78	19 generalized infection
1969–70	29 826	101	27	3 generalized infection
1970–71	32 319	237	25	No generalized infection
1971–72	33 075	79	2	No generalized infection
1972–73	8 333	8	Nil	No generalized infection

Meat inspection incidence

If at any time a tuberculous lesion is found in a carcass at an abattoir, all cattle on the farm of origin are tested to detect any further cases. In this respect 1 618 head were tested on three farms revealing 17 additional cases. All 17 reactors were in one herd, and these, together with 14 indefinite reactors, were slaughtered. These animals account for all the cases listed under Salisbury abattoir below.

Abattoir	Generalized infection	Localized	Total head
Salisbury	9	7	16
Bulawayo	4	8	12
Fort Victoria	8	1	9
Gatooma	—	1	1
Umtali	—	—	—
Total	21	17	38
1971–72	8	11	19

Johne's Disease: Not suspected or confirmed, the last case diagnosed was in an imported animal in 1969.

Brucellosis: The incidence varies between 1 and 5 per cent. in different districts. In all 178 000 doses of strain 19 vaccine were sold to farmers and, of the 2 597 serum samples tested, 199 were positive.

Vibriosis: The significance of this condition as a factor in our comparatively low calving percentage has not been determined.

Bacillary White Diarrhoea: Not confirmed for many years but a valid certificate of freedom from this disease is necessary before any hatchery can sell fowls or chicks for breeding purposes. Routine tests were carried out on 108 466 birds on 106 properties with negative results.

Fowl Typhoid: Sporadic cases occur, mostly in African-owned poultry.

Fowl Cholera: Confirmed in African-owned poultry. Infected and contact birds are slaughtered and compensation paid to the owners.

Theileriosis: In Rhodesia this condition is due to *Theileria lawrencei* infection and not to *Th. parva*. Efforts to reduce the incidence of *Theileriosis*, which is exclusively confined to European-owned properties, are being reasonably successful, and mortality rose slightly from 151 head in 1972 to 213 head in 1973, 36 farms being affected.

Trypanosomiasis

The steady improvement in the trypanosomiasis position throughout the country, with the exception of the eastern fringe of the Darwin district and part of the Chipinga district, has been maintained. Positive cases of this disease in cattle decreased from 5 698 in 1972 to 4 124 cases this year, but there are still some 505 000 cattle in marginal tsetse areas and these animals have to be inspected at regular intervals. Blood smears examined fell from 178 298 to 140 071 and treatments from 104 000 to 75 282 as compared to the previous year. A breakdown of the infecting species of trypanosomes is as follows:

Trypanosoma congolense	3 138
T. vivax	886
T. brucei	Nil
Mixed infections	100

Of the 75 282 treatments administered to cattle, 504 were Ethidium, 37 336 were Berenil and 37 442 were Istometamidium. 4 629 Isomethamidium treatments were also given to donkeys. In the 3 230 blood smears taken from this species 121 showed *T. congolense* and 13 *T. brucei*.

Tsetse Control

The 1973 spraying operations, involving the application of residual insecticide to the dry season resting and refuge sites of tsetse flies, were conducted during the period 1st June to 30th September. Problems were minimal and once again the operations were notable for the very few holdups caused by the breakdown of transport due to the unfailing service provided by the Central Mechanical Equipment Department. Fifty-nine spraying teams were mounted, which represents an increase of eight teams over last year, excluding the three Portuguese teams which were mounted then. A total quantity of 265 900 kg of 75 per cent. DDT wettable powder was dispensed over 10 969 km² of tsetse habitat in Rhodesia and Moçambique by pneumatic sprayers. The application rate varied according to the particular situation, but on the

country-wide basis at an average rate of 18,18 kg/km² active ingredient.

This is a truly massive annual undertaking and a mere statement of the area covered and insecticide dispersed gives no conception of the months of planning and physical hardships endured by the hundreds of people who have to walk many thousands of miles through most inhospitable country. The conscientious efforts of the staff concerned are most admirable.

Once again, game and cattle fences have played a big part in the control operations on all fronts. 1 213 km of game fence and 1 091 km of cattle fence were maintained. In the Urungwe area an all-metal reconstruction of the 180 km Naodsa–Angwa game fence and access road were completed. This is a major achievement in field construction work, because the country traversed was, without doubt, some of the most broken in Rhodesia, requiring skill and experience in planning the route from aerial photographs and subsequently marking it out on the ground. That Mr. R. D. Pilson, the Chief Glossinologist was able to plan the road with never more than a 1:10 gradient is a considerable feat.

Good progress was also made with the construction of the Border Barrier game fence along the eastern boundary for Gona-re-Zhou game reserve. By the close of the year the fence line and service track had been completely cleared from Marhumbini to the Lourenço Marques railway line, a distance of 116 km, and 86 km of fence had been erected.

RESEARCH

A. Trypanosomiasis

The routine examination of human and animal blood smears continued to be a major task of the Tsetse Blood Meal Laboratory, and some 5 394 blood smears were examined and processed. Research was carried out on the following aspects:

1. The effect of trypanosomiasis on game animals, with particular reference to kudu and bushbuck.
2. Chemotherapeutic Agents.
3. Trypanosomiasis of Sheep.
4. Cerebral Trypanosomiasis of Dogs.
5. Identification of Blood Meals derived from Tsetse Flies.

Excellent progress was made with the identification of blood meals during the year and for the first time since the inception of the blood meal section of the Central Laboratory, the backlog of meals was cleared.

The majority of the blood meals processed were from tsetse flies caught in areas where tsetse control hunting operations were being conducted. The results have proved extremely useful in detecting isolated pockets of Suids and other preferred hosts, thus enabling a much more critical approach in hunter direction. The percentage of blood meals which could not be identified increased as the tsetse flies came under stress (due to the reduction in numbers of preferred hosts), and it is now envisaged that further anti-sera will have to be prepared in order to embrace those animal species not normally fed on, but which could provide sustenance to tsetse flies in the absence of their preferred hosts. Primate meals continue to be a feature of the diet of tsetse flies and seem to have an inverse relationship to Bovid and Suid meals. It has also become apparent, that in order to assess the effectiveness of selective hunting operations by means of blood meal examinations, it is essential to take into account changes in tsetse density.

The separation of 350 Suid blood meals, collected in the Sengwa Research Area, Gokwe district, into warthog and bushpig feeds, showed that 97,7 per cent. were derived from warthog. Successful production of highly specific anti-sera to warthog and to bushpig was achieved by using the domestic Large White X Landrace pig. Specific anti-sera to eland and sable were also produced using ox and sheep respectively. An unsuccessful attempt was made to produce sheep anti-duiker serum.

B. Glossinology

Aspects investigated were:

1. Insecticide trials incorporating a sticker to prevent deposits of DDT being washed away by rain.
2. The resting behaviour and sites of tsetse.
3. Tsetse responses to sight and smell, which will form the basis of a thesis being submitted by Mr. G. A. Vale for his Ph.D. degree.

PUBLICATIONS

The following contributions were published or offered for publication:

Boyt, W. P. and Mackenzie, P. K. I. The persistence of a strain of *Trypanosoma rhodesiense* in a kudu (*Tragelaphus strepsiceros*). Rhod. Vet. J. (in press).

Emslie, V. W. and Steinberg, E. A. The production in the bovine of antibody specific for closely related species and the use of such antisera in the identification of tsetse blood meals. Ann. trop. Med. Parasit., **67**, 2, 1973.

Knottenbelt, D. C. Some pathological findings in the natural population of bushbuck (*Tragelaphus scriptus*) (in press).

Knottenbelt, D. C. An investigation into the incidence and pathology of natural trypanosomiasis in bushbuck (*Tragelaphus scriptus*) and kudu (*T. strepsiceros*) (in press).

Mackenzie, P. K. I. and Boyt, W. P. The pathology of local strains of *Trypanosoma brucei* for bovines in Rhodesia. Rhod. Vet. J., **4**, 1973.

Mackenzie, P. K. I. and Boyt, W. P. The epidemiology of human trypanosomiasis in Rhodesia. C. Afr. J. Med. (in press).

Mackenzie, P. K. I. and Cruickshank, J. G. Phagocytosis of erythrocytes and leucocytes in sheep infected with *Trypanosoma congolense* (Broden 1904). Res. Vet. Science (in press).

Osterhoff, D. R., Ward-Cox, I. S. and Emslie, V. W. A study of genetic markers in the South African blesbok (*Damaliscus dorcas phillipsi*). Koedoe, **15**, 1972.

Vale, G. A. Attractants for controlling and surveying tsetse populations. (Submitted to Prof. D. S. Bertram in September, 1973, for presentation at a laboratory meeting of the Royal Society of Tropical Medicine and Hygiene.)

NON-SPECIFIED DISEASES

Quarter Evil: 302 cases were confirmed on 91 properties, actual mortality is probably nearer 10

times this figure as many owners do not like admitting losses from this preventable source and young stock in most Tribal Trust Lands are not protected by vaccination.

Enterotoxaemia: Sporadic cases occur in all flocks which are not regularly vaccinated.

Tetanus: Deaths were recorded on five farms and are almost invariably associated with the mis-use of rubber rings for castration.

Tick-borne Diseases:

	Deaths 1973	*Deaths 1972*
Theileriosis	213	151
Redwater	80	72
Gallsickness	269	235
Heartwater	537	187

Bluetongue: Occurs in exotic sheep where vaccination was neglected—cases were recorded on five farms.

African Horsesickness: In Rhodesia most horses are vaccinated annually but sporadic cases occur in spite of this precaution.

Botulism: This condition occurs mostly in the Midlands and southern provinces, 166 deaths on 32 properties were attributed to botulism.

Mineral and Chemical Poisons: 638 deaths were recorded, arsenical poisonings at 187 head the list and urea at 153 were chiefly responsible. In 1972 the total was 769, with again arsenic at 445 and urea 108 head.

Plant Poisonings: 1 214 cattle deaths were attributed to plant poisons and Umkauzaan (*Dicapetalum cymosum*) led the field with 790 fatalities.

Blood Smears Examined by the Field Staff

Trypanosomiasis	4 124
Anaplasmosis	155
Redwater	97
Quarter Evil	50
Theileriosis	59
Heartwater	5
Negative	145 947
Total	150 437
1971–72	179 042

Post-Mortem Examinations at District Offices

District	*Bovine*	*Ovine*	*Porcine*	*Poultry*	*Miscellaneous*	*Total*
Salisbury	217	188	42	24	25	496
Bulawayo	204	120	129	2 921	33	3 407
Umtali	132	69	26	272	13	512
Gwelo	295	27	18	34	18	392
Victoria	61	40	20	102	7	230
Sinoia	101	67	15	88	2	273
Gwanda	7	9	6	17	—	39
Chipinga	32	12	1	39	3	87
Total	1 049	532	257	3 497	101	5 436
1971–72	1 218	870	228	4 279	132	6 727

VETERINARY RESEARCH BRANCH

The research and diagnostic functions of the laboratory expanded during the year, particularly those concerned with virology, bacteriology and biochemistry. Several major items of equipment were obtained and put into use including an ultra-violet spectrophotometer and a digital print-out, which were generously donated by the Rhodesia National Farmers' Union at a cost of nearly $5 000. We are most grateful for such interest and assistance.

Post-mortem examinations	*1971–72*	*1972–73*
Poultry	4 074	3 617
Cattle	18	28
Sheep	39	23
Pigs	22	63
Chinchillas	34	10
Rabbits	171	39
Bovine foetuses	174	126
Ovine foetuses	32	12
Other specimens		
Brains for rabies	499	357
Blood samples for brucellosis	2 777	2 964
Tampons for vibriosis	1 748	1 952
Milk samples for mastitis	1 045	1 793
Faeces	1 645	1 237
Meat hygiene specimens	3 973	4 512
Miscellaneous	8 044	10 646
Total	24 295	27 379

The investigation of these specimens and investigations for research purposes necessitated such examinations as:

	1971–72	*1972–73*
Bacteriological	8 512	11 722
Virological	1 273	757
Serological: Brucella	4 525	4 878
Vibrio	1 748	1 952
Virus	—	38 972
Histological	3 506	3 525
Haematological	2 847	3 214
Biochemical	4 124	8 500
Faecal egg examination	1 604	798
Rabies F.A. Tests	499	853
Total	28 638	75 171

Vaccine Sales

	1971–72 *Doses*	*1972–73* *Doses*
Rift Valley Fever/Wesselsbron	89 410	6 900
Pasteurella	11 020	9 500
Gallsickness	14 301	15 681
Redwater/Gallsickness	17 645	16 865
C.A. (Strain 19)	178 785	178 158
Horsesickness	8 527	11 126
Anthrax	46 000	23 500
Bluetongue	55 250	46 100
Calf Paratyphoid	6 984	6 542
Lamsiekte	69 150	118 550
Fowl Pox	446 700	561 000
Fowl Typhoid	49 800	34 300
Enterotoxaemia	46 650	47 550
Rev. 1	1 150	1 000
Lumpy Skin	81 486	93 220
Tetanus	600	710
Newcastle Disease (Inactivated)	2 516 910	596 000
N.C.D. La Sota Strain	2 728 000	8 825 000
Komarov	1 897 600	1 412 200
Hitchner	213 000	—
Heartwater	42	26
Nodular Worm Remedy	2 000	—
E. coli (cattle)	—	610
Enzootic Abortion	—	1 400
Leptospirosis	—	980

Virology and Immunology

Further development of the virology unit took place and a diagnostic and research programme was planned. Although the unit is well equipped and staffed, its relatively small size precludes any attempt to offer a complete diagnostic service for all species. As cattle are the most important animals economically, emphasis is placed on the diagnosis of their diseases with reasonable provision for the important diseases of other species such as Newcastle disease of poultry. The research programme is directed towards the investigation of the role of infectious agents in abortion and infertility in cattle.

To avoid duplication of work the virology section is now responsible for all serological examinations, including brucellosis and vibriosis, and for the diagnosis of the infectious agents intermediate between bacteria and viruses, that is the Mycoplasms, Rickettsias and Chlamydias.

Attempts to isolate infectious agents in virus diseases are often unsuccessful so that the main effort in the first instance is placed on serological investigations, particularly in abortion and infertility problems. In this way even negative results provide useful information which helps in planning further stages of the programme.

The complement fixation (C.F.) test with microtitre equipment and an element of automation offers certain advantages. It is quick, cheap and large numbers of sera can be processed with a minimum of labour.

Among the many conditions investigated were 15 bulls affected with epididymitis on an Insiza Ranch. Electro-ejaculates from the animals yielded 12 isolates of mycoplasma, of which two were used to infect three bulls. Two of these animals were slaughtered two months after infection and one showed lesions resembling those seen at Insiza. Full evaluation of the role of mycoplasms in infertility will be a long process as about half the isolates cannot be sub-cultured.

Investigations into the role played by game animals in the maintenance of foot and mouth disease continued. Of 18 probang samples (oesophageal scrapings) taken from buffalo on an island in Lake Kariba, no less than 15 proved to be positive for foot and mouth disease virus. SAT I virus was recovered from six of the samples and SAT II from nine others. It is interesting to note that this particular herd of buffalo had been isolated since the flooding of Lake Kariba in 1959—14 years ago.

During the year the following specimens were submitted to the Poultry Pathologist:

Fowls	3 064	Psittacines	200
Turkeys	277	Other birds	84
Gamebirds	408	Reptiles	2
Waterfowl	78	Fish	64
Pigeons	30		

Total: 4 207

The following scheduled diseases were confirmed: Newcastle disease 88 specimens; Fowl Cholera 12; Fowl Typhoid 3 and Fowl Paratyphoid 252.

Artificial Insemination

Only one commercial outlet functioned during the year, Animal Breeders Co-op. Since there is no local commercial supplier, the Provincial Veterinary Officer, Bulawayo, continued to sell semen purchased from Animal Breeders Co-op. This is for the convenience of local farmers and in the interests of disease control.

The breakdown of total sales by breeds is as follows:

	1971–72	*1972–73*
Dairy		
Holstein	11 254	13 254
Friesland	5 474	5 299
Jersey	1 697	2 492
Ayrshire	508	602
Guernsey	478	314
Beef		
Brahman	3 031	5 672
Simmentaler	5 332	4 752
Charolais	4 173	3 069
Africander	700	2 300
Sussex	670	1 230
Hereford	756	1 145
Aberdeen-Angus	210	224
Beefmaster	—	148
Red Poll	48	48
Tuli	—	32
Santa Gertrudis	102	20
Brown Swiss	—	15
Total	34 433	40 616

Publications

Chavunduka, D. M. Dehorning calves. Three articles. African Times.

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Condy, J. B. Observations on levels of parasitism in I, Kudu. Zool. afric. **7**, 413.

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Huchzermeyer, F. W. Free ranging hybrid chickens under African tribal conditions. Rhod. Agric. J. **70**, 73. (1973).

Huchzermeyer, F. W. Avian Kerato-Conjunctivitis. Trop. Anim. Heth. Prod. **5**, 72. (1973).

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Lawrence, J. A. Canine skin tuberculosis and histiocytoma. Rhod. vet. J. **4**, 19.

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Lawrence, J. A. Schistosoma matthei in cattle: the host-parasite relationship. Res. Vet. Sci. **14**, 400.

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MEAT INSPECTION

The detailed report of the Chief Veterinary Public Health Officer is issued as a separate report.

Once again the beef kill has exceeded expectations with another 18 per cent. increase over last

year's phenomenal figure. Liebig's abattoir at West Nicholson has handled some 14 000 head, and the fact that the existing C.S.C. abattoirs have handled an average of some 35 per cent. above maximum design capacity without a major mechanical breakdown or a meat hygiene catastrophe borders on the miraculous. It is most unlikely that the graph can continue upward at anything like the same angle until some necessary consolidation has taken place in the national herd, and Marandellas C.S.C. abattoir is functioning.

The slight increase in sheep slaughter figures is encouraging, although the total kill is still 20 000 less than in 1970.

The goat figure is disappointing for all that it has virtually doubled in the year. The 22 000 head killed by C.S.C. and Leshet Holdings at Umtali are a poor return for the joint efforts and expenditure of Government and private enterprise to try and reduce numbers on the ground. Some 31 000 were killed in private abattoirs, making a total of 53 000 commercially killed goats: if this figure were half a million there would be no complaint.

Pig slaughterings show a very welcome and considerable (22,1 per cent.) upward trend, reversing the losses of the previous two years. There is still plenty of spare slaughter capacity in the Colcom works at both Bulawayo and Victoria, and there seems little doubt that if marketing avenues improve there is plenty of production potential to use Colcom facilities to the full.

Cattle Breakdown Figures

	Bulls	*Cows*	*Oxen*	*Calves*
1972–73 % of kill	1,36	40,18	56,89	1,57
1971–72 % of kill	1,33	44,2	52,48	1,99

Calf slaughterings show a slight drop, and it is significant that the age presentation of this class of slaughter animal has become progressively younger in Salisbury where the majority of calves are handled, so much so that it has become necessary to warn producers of markedly increased condemnations for immaturity amongst the very young calves presented.

The slight drop in the percentage of cow slaughterings gives scant reason for rejoicing when seen against the gross facts that of the females this year, 100 000 were young well nourished heifers, often of excellent type and optimal breeding potential. One cannot escape the conclusion that there is something wrong with a husbandry system that permits this type of animal to be slaughtered at premium prices in the face of a declining national European-owned herd, while old cows of poor type and limited breeding potential graze unmolested on the drought-stricken veld.

No count of pregnant cows was undertaken this year as the C.S.C. has taken over this function on a larger scale at all centres.

Offtake from Tribal Trust Lands

The slight increase in this figure does not represent much of a gain either in total slaughterings or percentage contribution to C.S.C. throughput; in fact the direct purchases of slaughter cattle in T.T.L.s by the C.S.C. has dropped from 8,1 per cent. to 7,3 per cent. of total C.S.C. slaughterings. Cattle killed and eaten in tribal areas, those bought privately and those marketed through co-ops are not taken into consideration here, and may be considerable.

Total condemnation of carcasses

	Cattle %	*Sheep* %	*Goats* %	*Pigs* %
Salisbury	0,34	0,23	1,83	0,37
Bulawayo	0,31	0,19	0,88	2,71
Fort Victoria	0,60	0,17	19,23	1,00
Gatooma	0,41	—	—	—
Umtali	0,31	2,24	9,91	0,12
West Nicholson	0,82	—	—	—
Total	0,40	0,51	4,80	0,95
1971–72	0,44	0,54	0,51	0,90

Main reasons for condemnations

Of the carcasses condemned the following conditions were mainly concerned:

Cattle	*1972–73* %
Sarcocysts	21,96
C. bovis	20,32
Emaciation and Oedema	12,99
Bull Oedema	7,86
Icterus	7,54
Septic conditions	6,49
Septicaemia/Pyaemia	5,69
Pleurisy and Peritonitis (gen)	3,89
Trauma	2,53

The order of importance of reasons for condemnation is virtually unaltered with the exception of septic conditions which have shown a noticeable increase. Emaciation and oedema cases have been less numerous than could be expected this year, but the worst of the dry season is still ahead. Once again there was no case of an acute contagious disease in an export abattoir.

Sheep and goats

The most notable features here are the large number of emaciated goats presented in Umtali goat abattoir, easily accounted for by weather conditions, and a considerable incidence of generalized caseous lymphademitis, not so easily accounted for, at the same centre. Other infections show a drop.

Pigs

Septic conditions and pyaemia show a welcome drop this year, with 182 fewer carcasses having required condemnation.

Cattle

Cysticercus bovis

(Beef measles)

	Condemned %	*Detained* %	*Incidence* %	1971–72 %
Salisbury	0,06	1,35	1,40	1,76
Bulawayo	0,09	0,86	0,95	1,21
Fort Victoria	0,06	1,10	1,16	0,77
Gatooma	0,14	2,18	2,26	2,71
Umtali	0,03	1,44	1,47	0,93
West Nicholson	0,03	1,31	1,34	—
Total	0,08	1,36	1,44	1,62
1971–72	0,097	1,52	1,62	

Fasciola gigantica

(Liver fluke)

	Condemned	*Trimmed*	*Incidence*	*1971–72*
	%	%	%	%
Salisbury	26,39	20,68	47,07	47,41
Bulawayo	19,47	4,82	24,30	18,50
Fort Victoria	16,20	1,59	18,42	24,08
Gatooma	29,15	12,62	41,78	42,97
Umtali	24,68	13,76	38,44	32,20
West Nicholson	6,42	2,04	8,46	—
Total	23,05	11,11	34,17	34,36

There are no surprises here—the incidence remains at approximately one-third of all livers over the whole country, with regional patterns coinciding very closely with average rainfall and trapped surface water. This parasite still accounts for a greater mass of condemned liver than the total mass of all carcasses condemned for all reasons, and has cost the C.S.C. a possible $300 000 in lost revenue in the past 12 months. Whether it has cost the producer anything in immediate returns is much less clear and there appears to be little incentive for farmers to dose against this parasite alone.

Tuberculosis

	Generalized	*Localized*	*Total head*
Salisbury	9	7	16
Bulawayo	4	8	12
Fort Victoria	8	1	9
Gatooma	—	1	1
Umtali	—	—	—
West Nicholson	—	—	—
Total	21	17	38
1971–72	8	11	19

Although slightly higher than last year, the incidence of this disease can be described as sporadic in occurrence and negligible in extent. One heavily infected herd was detected in Mashonaland and the tuberculin test reactors on this property accounted for 16 of the 38 carcasses recorded above.

Trauma condemnations

	Carcasses	*F/Q/legs*	*H/Q/legs*	*Tails*	*Total mass*
					kg
Salisbury	36	82	65	62	14 776
Bulawayo	8	174	18	125	4 800
Fort Victoria	8	27	21	583	1 652
Gatooma	12	18	3	72	979
Umtali	6	4	3	9	360
West Nicholson	—	219	4	72	662
Total	70	524	114	923	23 229
1971–72	73	465	91	752	17 696

A slight increase is noted here, proportional to the larger kill. It may be that with the opening of regional abattoirs in Marandellas and Sinoia train travel for slaughter animals will be reduced and this will reflect in the bruising condemnations. However, it should be said that the distance travelled is a very small factor compared with the consequences of loading methods and mixed consignments.

Sheep and goats

Stilesia hepatica

	Livers condemned (sheep and goats)	*Ox livers condemned*
	%	%
Salisbury	88,9	0,19
Bulawayo	90,4	0,65
Fort Victoria	92,8	0,46
Gatooma	—	0,17
Umtali	—	0,75
West Nicholson	—	—
Total	89,9	0,36
1971–72	86,8	0,40

The prevalence of this parasite in small ruminant livers is a chronic and, so far, insoluble problem.

Pigs

C. cellulosae

(pork measles)

	Condemned	*Detained*	*Total*	*Incidence*	1971–72
				%	%
Salisbury	68	6	74	0,07	0,06
Bulawayo	837	—	837	2,29	1,76
Fort Victoria	67	—	67	0,55	0,33
Gatooma	—	—	—	—	—
Umtali	—	—	—	0,00	0,17
West Nicholson	5	—	5	3,79	3,18
Total	977	6	983	0,61	
1971–72	542	1	543	0,41	

An increase of 440 cases may seem alarming, but 400 of these occurred in Bulawayo where the number of free range pigs increased by 8 000. The incidence of measles in African-owned pigs at this centre was 4,42 per cent., while in intensively raised European-owned animals, it was 0,05 per cent.

Ownership proportions

	European	*% of total*	*African*	*% of total*
Salisbury	102 106	93,6	7 016	6,4
Bulawayo	17 869	48,8	18 723	51,2
Fort Victoria	7 717	63,8	4 386	36,2
Gatooma	—	—	—	—
Umtali	1 587	62,1	969	37,9
West Nicholson	10	7,6	122	92,4
Total	129 289	80,6	31 216	19,4
1971–72	110 815	84,3	20 601	15,7

It is encouraging to see an increase in African-owned pigs coming forward, particularly where these have been well bred and intensively housed. Unfortunately this type of animal is in the minority, and considerable disappointment is caused by the parasitic diseases inherent in a free range environment.

Animals dead on arrival

	Cattle	*Pigs*	*Sheep and goats*
Salisbury	12	126	2
Bulawayo	7	21	2
Fort Victoria	—	—	—
Gatooma	13	—	—
Umtali	—	8	—
West Nicholson	—	—	—
Total	32	155	4
1971–72	44	80	6

Cattle and goat figures show a slight drop, and causes were chiefly trauma, poverty and stress.

Pig figures have nearly doubled, and the cause of death was the porcine stress syndrome in the vast majority of cases. Clearly the problems of moving pigs to slaughter have not yet been solved.

Game carcass inspections

Summarized returns for the year are as follows:

Fort Victoria (Impala Ranch)	20 head
(Mazunga)	799 head
(Henderson)	545 head
Total	1 364

Of the above, 1 042 were impala, with smaller numbers of wildebeest, kudu, zebra, steenbok, duiker, giraffe and buffalo.

MEAT HYGIENE LABORATORIES

Details of the activities appear in the Chief Veterinary Public Health Officer's separate report; in summary it can be said that both the volume and range of functions have increased at all centres.

Swab cultures for Salmonella

Boneless beef

	Swabs	*Positive*	*%*	*% 1971–72*
Bulawayo	13 720	14	0,51	1,25
Salisbury	2 455	8	1,63	0,86
Gatooma	2 152	—	—	0,19
Total	18 327	22	0,60	
1971–72	28 810	52	0,90	

A slightly reduced rate of sampling accounts for the lower numbers. The reduced positive incidence is gratifying.

Abattoir swabs

These have been taken from a variety of sites including carcasses, working surfaces, drains, digestive tracts, gall bladders, etc., and therefore represents a cross-section of the most and the least likely places to find Salmonellas.

	Swabs	*Positive*
Bulawayo	318	2
Salisbury	176	1
Gatooma	2 648	297
Total	3 142	300
1971–72	3 101	57

Meat inspection aids

Pyaemia/Septicaemia carcasses:

	Pigs	*Positive*	*Cattle*	*Positive*
Salisbury	441	58	70	9
Bulawayo	—	—	6	3
Gatooma	—	—	5	4
Total	441	58	81	16

Once again these results illustrate the point that detention for bacteriological tests results in a saving of carcasses.

Notes on new and established abattoirs

1. *Colcom* opened their new works in Fort Victoria in April, 1973, and this is proving to be a model plant in most ways. The inevitable problems of waste disposal will doubtless be solved satisfactorily, and the management of Colcom must derive a great deal of satisfaction from their two new abattoirs.

2. *Messrs. Leshet Holdings* are the fourth and current owners of the Umtali goat abattoir, and must take the credit for achieving not only the eventual approval of this Department for their export unit, but also for the first exportation of goat carcasses. It would give great satisfaction to be able to report that this abattoir's activities have made a significant inroad into the country's goat population, but not even a noticeable dent is likely at current slaughter levels.

3. *Liebig's* factory at West Nicholson has been renovated as a cattle slaughter line, with the alterations being most expeditiously and expertly carried out to help deal with this year's record cattle kill. A very satisfactory unit has resulted which turns out a good carcass.

4. *Irvine's Day Old Chicks* have altered and revised their poultry slaughter unit to bring it into line with export standards.

5. *C.S.C. Abattoirs.* The main advances to be reported are the excellent progress being made with the new Marandellas works, and that excavation has started at Sinoia. The Marandellas buildings are most impressive, and with the experience of Gatooma to draw upon, this factory should approach the ultimate in line dressing plants.

CENSUS OF STOCK

Census figures are given in the Appendix.

Acknowledgements

The assistance and co-operation of many other organizations and sectors of Government are gratefully acknowledged, particularly the Rhodesia National Farmers' Union, Cold Storage Commission, the Ministry of Internal Affairs and the Ministry of Lands and Natural Resources.

Sincere thanks and appreciation are also due to my own staff for their conscientious devotion to duty.

J. M. WILLIAMSON,
Director of Veterinary Services.

APPENDIX

Census of cattle, 1972–73

District	European-owned cattle	African-owned cattle	Total cattle
Mashonaland	778 793	598 644	1 377 437
Matabeleland	454 998	556 139	1 011 137
Midlands	355 663	520 466	876 129
Manicaland	169 996	406 228	576 224
Victoria	353 496	598 987	952 483
Sinoia	286 391	98 984	385 375
Gwanda	114 487	205 331	319 818
Chipinga	58 986	77 802	136 788
Totals	2 572 810	3 062 581	5 635 391
1971–72	2 683 955	2 889 587	5 573 542
Difference	−111 145	+172 994	+61 849

Small stock census

	Pigs			Sheep			Goats			Equines		
	European owned	African owned	Total	European owned	African owned	Total	European owned	African owned	Total	European owned	African owned	Total
Mashonaland	59 402	30 131	89 533	96 843	29 128	125 971	8 885	116 456	125 341	3 115	7 445	10 560
Matabeleland	11 129	23 700	34 829	39 047	173 995	213 042	7 752	718 264	726 016	2 103	51 857	53 960
Manicaland	7 112	6 310	13 422	21 800	43 823	65 623	1 634	159 344	160 978	702	3 120	3 822
Midlands	5 197	9 489	14 686	30 668	57 756	88 424	4 755	276 526	281 281	1 303	52 297	53 600
Victoria	5 150	21 707	26 857	20 911	114 299	135 210	4 675	326 961	331 636	833	23 423	24 256
Sinoia	8 766	7 551	16 317	33 576	15 691	49 267	3 924	36 973	40 897	799	2 938	3 737
Gwanda	1 636	3 733	5 369	3 786	31 283	35 069	2 416	139 068	141 484	183	20 101	20 284
Chipinga	760	1 453	2 213	6 901	5 768	12 669	372	33 944	34 316	426	3 192	3 618
Totals	99 152	104 074	203 226	253 532	471 743	725 275	34 413	1 807 536	1 841 949	9 464	164 373	173 837
1971–72	82 923	105 238	188 161	272 706	461 382	734 088	33 773	1 601 621	1 635 394	9 775	144 181	153 956
Difference	+16 229	−1 164	+15 065	−19 174	+10 361	−8 813	+640	+205 915	+206 555	−311	+20 192	+19 881